THE PRIMULAS OF EUROPE

MACWATT

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THE PRIMULAS OF EUROPE

First published in 1923.

P. CARNIOLICA, JACQ.

THE PRIMULAS OF EUROPE

BY

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LONDON

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PREFACE

My aim in the following pages has been to produce a handbook to assist the student in the identification of those species of the genus Primula which are native to the European Continent, including the varieties produced by peculiarities of soil, climate and position, and the numerous interesting hybrids whose origin is due to natural or artificial cross-fertilisation, and at the same time to furnish some practical guidance to the cultivation of such of them as have been introduced into our gardens where the conditions differ so widely from those prevailing in their natural habitats. While popular in form I trust that the descriptions given will be found to be in accordance with the latest botanical research, but I can hardly hope, in a book written in the few hours of leisure allowed by a busy professional life, to have escaped errors. On the practical side, the work is based on my personal observation and experience as a horticulturist, and the cultural hints given are offered with some degree of confidence.

By the kind permission of the Council of the Royal Horticultural Society I am enabled to use an admirable arrangement of the genus Primula, adapted from Pax and drawn up by the Editor of the Society's "Journal," as well as a list of the European species of Primula with synonymy. Both are much more concise than any others

I have seen and will be found most helpful to those who wish to identify any species in their garden.

My thanks are also due to Miss Amy Cameron, Trinity, Duns, for the generous way in which she has expended time and labour in the photographs which add so greatly to the value of the book.

J. M.

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INTRODUCTORY

An ardent love of flowers lured me early in life to gardening as a recreation, and the more I indulged in my hobby the greater became my devotion to the bewitching Goddess Flora. 'Twas but in accordance with the usual trend of things that among the many and varied families of plants that claimed a share of my affections one particular flower should finally woo and win my special love, becoming the favoured among favourites. That flower is the Primula. It is not for me to enforce my creed or thrust my tastes upon my fellow-gardeners, and it is far from my intention to suggest that the favourite flowers of others are less worthy of esteem. It should suffice to describe the charms of the Primula in its varied species and varieties, and to assist to the best of my ability those who desire to acquire a knowledge of their characters and cultural requirements. The genus Primula embraces many species, their distribution being almost world-wide. Five species only are indigenous to the British Isles, and of the twenty-one sections into which Pax divides the genus, only three contain European species. The classification I have adopted in this work is that followed by Pax in his well-known work on the Primulaceæ, to which in other respects I have been much indebted. My experiences as a cultivator of Primulas have been varied. With some species no great difficulties have been encountered, but others have proved so

capricious that I have been sorely puzzled, and for a while entirely nonplussed, in my efforts to coax them out of languishing and unhappy moods. Sleepless nights, indeed, have not been unknown as a consequence of my anxiety to solve the mystery of some new-found gem's obstinate refusal to appreciate the lavish attention bestowed upon it. Carefully prepared compost, cool, moist nooks, and constant vigilance have sometimes failed to satisfy a winsome but fastidious stranger, but I have never grudged the trouble taken, and oft-times have learned eventually that I had erred on the side of excessive solicitude, and that less careful treatment, and, indeed, in some cases a measure of neglect, resulted in the yearned-for health and happiness of my treasure. It is wonderful how such a study broadens one's range of interest, and as I contemplate the pleasure I have enjoyed and think of the many interesting people with whom my hobby has brought me into contact I am sincerely glad I took up this fascinating study. Let not the foregoing remarks lead anyone to suppose that Primulas are fit subjects only for a connoisseur's collection, to be nursed and tended incessantly, for many of the finest species are plants of the least exacting requirements which will thrive under quite ordinary conditions, and, moreover, are extremely useful for either beds, borders, or rockery. Indeed, our gardens in spring would be sadly impoverished by the absence of the many Primulas which flower profusely before other things have awakened from their winter's slumbers. Mention need only be made of Alpine Auriculas, so chaste in form and rich in colouring, or the free-flowering and brilliant Polyanthus of many hues to remind us of the debt we owe to Mistress Primula for venturing forth in her dainty garb before the wintry

blasts have fully spent their force, whilst in the rock garden the various mountain species and their hybrids constitute an outstanding feature of their season. On the margins of shrubberies, under tall-growing trees, beside brooks or lily ponds, or in the wild garden, Primulas play a part that could be taken by very few substitutes.

Broadly speaking, the two great essentials to successful culture of even the choicest Primulas are suitable soil (which must be varied to meet the particular needs of certain species) and situation. A study of the native habitats of the plants will in most cases afford the most useful clue to any peculiarities in their requirements. Primroses, as is well known generally, grow in proximity to deciduous trees or shrubs, thus obtaining in the early days before the trees are full of leaf the benefit of spring sunshine, whilst in the heat and drought of summer a mantle of foliage overhead protects them from scorching sunshine. It should be our aim to imitate these conditions, to provide their equivalent, remembering that more Primulas succumb to excessive sun-heat in summer than to the severest frosts of winter. One may often contrive to provide the required shade when it is otherwise unavailable by planting a few quick-growing but light and airy annuals in close proximity to Primulas.

Observation will reveal that some Primulas produce in the course of time elongated stems which raise the crown of the plant considerably above the ground level. These are kinds which in their wild state grow in depressions and on slopes, where, when the spring thaw comes, the melted snow brings with it in its descent from the higher ground loose soil, fragments of stone, dead foliage, and the like, which would smother the plants were it not for the elongated stems I have referred to, which, of course,

serve their purpose of keeping the crown above the dressing of loose material, which thus becomes a beneficial mulch of loose, often very rich, compost. This supplies a hint that such Primulas should be provided with a mounding or top-dressing of light leaf soil with which stone chippings, gravel, brick or lime rubble has been mixed. Most Primulas under cultivation are inclined to be impatient of excessive winter moisture, and it is well to afford protection from heavy rains by tilting squares of glass over the plants in winter. Beware of using too much manure for the slower-growing types, but for the most part lime rubbish will be found beneficial.

In succeeding chapters particular points of cultivation are dealt with, and it will be found that, starting with the more robust species and varieties, one may, with a very slight expenditure of time and care, obtain an immense amount of enjoyment, and, speaking from my own experience, the more one becomes acquainted with this family, the more one's interest grows, until it is a delight to acquire additions to the collection and win success with some variety which has erstwhile taxed both skill and patience.

JOHN MACWATT.

"Morelands,"
Duns.

THE PRIMULAS OF EUROPE

CHAPTER I

PRIMULACEÆ

Natural Order—Primulaceæ, with Bibliography and Synonymy — Morphology — Anatomy — Teratology — Characteristics of Natural Order—Key to Primulaceæ.

The following bibliography and synonymy of the order *Primulaceæ* may be useful for purposes of reference, although not absolutely complete. It includes, nevertheless, most of the works of the greatest importance and value on the subjects. For this list I am mainly indebted to the work of Pax, already referred to.

General and Systematic.—Ventenat, Tabl. Règne Végét., II. (1794), 285.—Endlicher, Gen. Pl. (1836–40), 729.—Schnizlein, Iconogr., II. (1843–70), t. 156.—Ledebour, Fl. Ross., III. (1846-52), 8.—Duby, Mém. Fam. des Primulacées; in Mem. Soc. Phys. d'Hist. Nat. Genève, X. (1843); in D C. Prodr., VIII. (1844), 33.—Lindley, Vegetable Kingdom (1847), 644.—Reichenbach, Icon. Fl. Germ., XVII. (1855).—Miquel, in Fl. Brasil., X. (1856), 257.—Bentham and Hooker f. Gen. II. (1873), 628.—Hooker f. Fl. Brit. Ind., III. (1882), 482.—Pax, in Engler u. Prantl. Pflzfam., IV., I. (1889), 98.—Pax and Knuth, in Das Pflanzenreich (*Primulaceæ*), IV., 237 (1905).

Morphology.—Duchartre, Observations sur l'Organo-

génie de la Fleur in Ann. Sc. Nat., 3, Series II. (1844), 279.—Payer, Traité d'Organogénie (1857), 611, t. 153.—Van Tieghem, Structure du Pistil des Primulacées in Ann. Sc. Nat., 5, Ser. XII. (1869), 329.—Pfeffer, Blütenentwicklung der Primulaceen in Pringsheim's Jahrb., VIII. (1872), 194.—A. Braun, Ueber die Placenta der Primulaceen in Verh. Bot. Ver. Brandenburg, XVI. (1874), 49.—Eichler, Blütendiagr., I. (1875), 322.—Celakovsky, Vergl. Darstellung Placenten in Abh. Boehm. Ges. Wiss. Prag., 6 Folge, VIII. (1876), 48.—Pax, Monographische Uebersicht Arten Primula in Engler's Bot. Jahrb., X. (1889), 75.—Widmer, Europ. Arten Primula (1889).—Schumann, Blutenschluss (1890), 363.—Pax and Knuth, in Engler's Das Pflanzenreich (*Primulaceæ*), IV., 237 (1905).

Anatomy.—Kamienski, Vergl. Anatomie der Primeln Diss. Strassburg (1875); in Abh. Naturf. Ges. Halle, XIV. (1878), 143, t. II.–XI.—Westermaier, Vergl. Anat. Pflanzen in Monatsber. Akad. Wiss. Berlin (1881), 1050.—Van Tieghem and Douliot, Groupement des Primevères in Bull. Soc. Bot. France, XXXIII. (1886), 126.—Solereder, System. Anat. (1899), 566.—Nestler, Hautreizende Primeln (1904).

Teratology.—Masters, Vegetable Teratology (1869).—Penzig, Pflanzenteratologie, II. (1894), 122.

Biology.—Schott, Wilde Blendlinge Oesterr. Primeln (1852).—Darwin, On the Two Forms of Dimorphic Condition in the Species of Primula, in Proceedings Linnæan Society, VI. (1862), 77; Different Forms of Flowers (1877).—Kerner, in Oesterr. Bot. Zeitschr., XXV. (1875), 77.—P. Knuth, Bluetenbiologie, II., 2 (1899), 301.

Geographical Distribution. — Pax, Monograph. Uebersicht Arten Primula in Engler's Bot. Jahrb., X.

(1889), 75.—L. Blanc and E. Decrock, Distribution Géogr. Primulacées in Bull. Herb. Boissier, VI. (1898), 681.—R. Knuth, Geogr. Verbreitung der Primulaceen in 82 Jahresb. Schles. Gesellsch. Breslau (1905), 6.

Characteristics of the Natural Order *Primulaceæ* (Vent.).

Herbs, with alternate opposite verticillate or basal leaves, and perfect regular flowers, in terminal or axillary racemes, spikes, umbels or corymbs, or solitary in the axils or at the summit of a scape. Calyx free from the ovary (adnate to the lower part in Samolus), 4- to 9-parted or cleft (usually 5-parted), persistent or rarely deciduous. Corolla gamopetalous, 4- to 9-lobed or cleft (usually 5-cleft), rotate, funnelform, salver-shaped or campanulate, deciduous. Stamens as many as the corolla lobes, and opposite them, hypogynous or rarely perigynous, inserted on the tube or base of the corolla; filaments distinct, or connate at the base; anthers introrse, attached by their backs to the filaments, 2-celled, the sacs longitudinally dehiscent. Disk obsolete or absent. Ovary superior, 1-celled; placenta central, free; ovules anatropous or mostly amphitropous; style 1; stigma simple, capitate, entire. Capsule, 1-celled, 2- to 6-valved; rarely circumscissile or indehiscent, the valves erect or recurved, entire or 2-cleft. Seeds few or several, the testa adherent to the fleshy or horny copious endosperm, embryo small, straight; cotyledons obtuse.

THE PRIMULACEÆ.

The Natural Order Primulaceæ comprises a number of most attractive plants, which have rendered great

service to horticulture for many years. It has long provided the gardener and florist with many of their choicest favourites, and a recent influx of new species, mainly from the Far East, has drawn increased attention to the genus Primula, the subject of our special consideration. These new species deserve full consideration; but it should always be remembered that our European species of Primula and their hybrids stand second to none in intrinsic beauty, and that they are frequently more easily accommodated with their requirements in our British gardens than are many of these newer non-European species, some of which it is almost impossible to cultivate in the open in British gardens. The lover of beautiful flowers will find among these European Primulas a host of exquisite plants, and the student of their botanical features will also derive from these species a great deal of pleasure and profit. While this work is devoted to the European Primulas, it appears to the writer that it is necessary, in order to arrive at a proper understanding of their position in the Natural Order Primulaceæ, and also in the genus Primula, to give a general survey of the order and to supply some idea of the relationship of the different plants, European and non-European, to each other.

In the abundance of literature which has appeared on the subject there are some works of outstanding importance. One of these is the monumental monograph of the order which was written by Pax and Knuth in Engler's "Das Pflanzenreich," which has formed the basis of a great part of this book, and from which much valuable information has been drawn. Another is the Report of the Primula Conference of the Royal Horticultural Society, held in 1913, where, in addition to the

paper by the author, some valuable contributions to the subject were made by Professor Bayley Balfour of Edinburgh, and others. Moreover, the pamphlet of E. Widmer, "Die Europäischen Arten der Gattung Primula," has enabled the author to check some of his conclusions.

Key to the Primulaceæ.

For purposes of identification the following key, although not essential to the study of the Primulaceæ, may be found useful. It gives the distinctions between the leading genera of the order.

Lobes or segments of the corolla erect or spreading, not reflexed.

Lobes of the corolla imbricated, at least in the bud.
Ovary wholly superior.
Terrestrial scapose plants; leaves not pinnatifid.
Corolla tube longer than the calyx; style slender. 1. Primula.
Corolla tube shorter than the calyx; style short. 2. Androsace.
Aquatic leafy-stemmed plant; leaves finely pinnatifid. 3. Hottonia.
Ovary adnate to the calyx. 4. Samolus.
Lobes of the corolla convolute or valvate, at least in the bud (corolla wanting in *Glaux*).
Capsule longitudinally dehiscent.
Corolla rotate, or rarely short funnelform.
Stem leafy throughout; flowers yellow or white.
Staminodia none; corolla lobes convolute; flowers axillary or racemed. 5. Lysimachia.

Staminodia 5; each corolla lobe curved around its stamen (included in *Lysimachia* by some). 6. Steironema.

Staminodia 5; tooth-like; flowers in axillary; spike-like racemes or heads (included in *Lysimachia* by some). 7. Naumburgia.

Leaves whorled at the top of the stem; flowers white. 8. Trientalis.

Corolla none; flowers minute, solitary in the axils. 9. Glaux.

Capsule circumscissile; flowers axillary.

Corolla longer than the calyx; stamens borne on its base. 10. Anagallis.

Corolla shorter than calyx; stamens borne on its tube. 11. Centunculus.

SEGMENTS OF THE COROLLA REFLEXED.

Plants scapose. 12. Dodecatheon.

Cyclamen, which is tuber-bearing; Soldanella, which has the corolla lobes fimbriated and reflexed; and Coris, which has irregular flowers, all of which are readily distinguished, have been omitted from the above.

The genus which gives the botanists most difficulty in distinguishing it from the Primula is that of Androsace, but the latter may be identified by the corolla tube being shorter than the calyx and by the short style. The corolla tube of the Primula is longer than the calyx, and the style is slender.

CHAPTER II

GENUS PRIMULA

Bibliography—Arrangement of Genus Primula—European Species of Primula, with Synonymy.

Primula L.

Bibliography. — Primula L. Gen. ed. 1 (1737), 40; Spec. pl. ed. 1 (1753), 143.—Lehmann, Monogr. Primul. (1817).—Duby, in D C. Prodr., VIII. (1844), 34.—Schott, Sippen Oesterr. Prim. (1857).—Reichb., Icon. Fl. Germ., XVII. (1855), Regel in Acta hort. petropol., III. (1874), 127.—Benth. and Hook. f. Gen., II. (1873), 629.—Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 77.—Hook. f. Fl. Brit. Ind., III. (1882), 482.—Pax, in Engler's Bot. Jahrb., X. (1899), 75; in Engler u. Prantl, Pflzfam., IV., 1 (1889), 105.—Widmer, Europ. Arten Primula (1891).—Kusnetzow, Fl. Cauc. Critic., IV. (1901), 49.—*Auricula ursi* Tourn. Instit. (1719), 120.—*Pr. veris* Tourn. Instit. (1717), 123.—*Aleuritia* Spach, Hist. Nat. vég. Phanér., IX. (1840), 360.—*Primula* Section *Typo-primula* O. Ktze. in Post et Kuntze, Lexicon (1904), 459.

Description.—Calyx tubular, campanulate or funnel-shaped, often inflated, persistent; lobes imbricated. Corolla hypogenous, funnel-shaped or hypocrateriform, less often sub-campanulate; tube elongated; throat enlarged, naked or less or more annulated; lobes spreading (patent) or less often erect, entire or bilobate,

imbricated. Stamens attached to the tube or throat, included; filaments very short, anthers blunt. Ovary globose or ovate, in the latter case thickened at the apex; style filiform; stigma capitate. Ovules numerous, placenta central free, oftener stipitate inserted or immersed, half inverted. Capsule globose or cylindrical, many seeded, valves 5-10 dehiscent. Semina more or less peltate, somewhat flat on the back, convex in front. Embryo transverse. Herbs with a perennial rhizome, more rarely annual. Leaves all basal, undivided or lobed, petiolate or sessile. Flowers large or medium, more rarely small, dimorpho-heterostyled, ebracteolate, disposed in umbellate or capitate scape or in superposed whorls, more rarely racemose or spiked, seldom in a solitary scape. The involucre bracts leafy or narrow.

Arrangement of the Genus Primula.

Reprinted from the Royal Horticultural Society's Report of their Primula Conference held on April 16, 1913, published in the Journal of the Society, Volume XXXIX., Part I., August, 1913.

In almost all Primulas the young leaves have their margins rolled backward when they first emerge from the bud, but in two sections, (4) Floribundæ and (21) Auricula, the margins of the young leaves are rolled inwards. These two sections are thus readily distinguished from all the others, and the point is not mentioned again below.

Section 1. *Sinensis*, Pax (26 species). Leaves distinctly petiolate, lobed, dentate or crenate—

e.g., *Primula sinensis*, *P. obconica*, *P. cortusoides*, *P. mollis*.

Section 2. *Fallaces*, Pax (4 species). Leaves petiolate, cordate, thin, rugose, hairy; inflorescence 2- to 6-flowered, bracteate—

e.g., *P. jesoana*, *P. Reinii*.

Section 3. *Monocarpicæ*, Franch (4 species). Leaves slightly lobed, calyx enlarging after flowering—

e.g., *P. malacoides*, *P. Forbesii*.

Section 4. *Floribundæ*, Pax (6 species). Leaves thin; flowers in superposed whorls with involucres of leafy bracts—

e.g., *P. floribunda*, *P. verticillata*.

Section 5. *Petiolaris*, Pax (7 species). Leaves almost or quite glabrous, narrowed to their insertion, dentate, with a wide midrib; flowers large, stalked, arranged in an umbel, on a long or very short scape (comparable in this with the common Primrose), capsule globose—

e.g., *P. petiolaris* (*P. Winteri*).

Section 6. *Bullatæ*, Pax (5 species). Leaves coriaceous, hairy, short; flowers stalked—

e.g., *P. bullata*.

Section 7. *Carolinella* (Hemsl), Pax (4 species). Like Section 6, but with large leaves—

e.g., *P. megaseæfolia*, *P. Henryi*.

Section 8. *Vernales*, Pax (8 species). Leaves membraneous, rugose, usually narrowed to the base, rarely cordate; flowers stalked—

e.g., *P. acaulis*, *P. elatior*, *P. Juliæ*.

Section 9. *Soldanelloideæ*, Pax (15 species). Leaves

more or less hairy; flowers not or but shortly stalked, bracts short and broad—

e.g., *P. uniflora, P. Reidii.*

Section 10. *Farinosæ*, Pax (24 species). Leaves glabrous or nearly so; flowers more or less stalked, bracts saccate at base—

e.g., *P. farinosa, P. frondosa, P. longiflora, P. rosea.*

Section 11. *Capitatæ*, Pax (11 species). Characters as under Section 9, but with lanceolate or subulate bracts; flowers stalked or not—

e.g., *P. denticulata, P. capitata.*

Section 12. *Minutissimæ*, Pax (3 species). Plants small or minute; leaves toothed; plant stoloniferous—

e.g., *P. minutissima.*

Section 13. *Tenellæ*, Pax (7 species). Plants small; leaves small, glabrous or nearly so, leaves subcoriaceous, narrowed to the petiole; flowers one or two on a scape; capsule globose—

e.g., *P. yunnanensis.*

Section 14. *Nivales*, Pax (15 species). Leaves glabrous or nearly so, entire or denticulate, petiole winged; capsule cylindrical—

e.g., *P. sikkimensis, P. Stuartii, P. nivalis.*

Section 15. Omphalogramma, Franch (4 species). Leaves not lobed, plant without stolons; bracts absent; flowers solitary—

e.g., *P. Elwesiana.*

Section 16. *Macrocarpæ*, Pax (10 species). Glabrous or nearly so; leaves contracted to a petiole, cuneate or

rounded, dentate at apex; capsules cylindrical or ovoid—

e.g., *P. Suffrutescens, P. Souliei.*

Section 17. *Callianthæ*, Pax (16 species). Glabrous or nearly so; leaves coriaceous, obtusely denticulate; flowers umbellate, very shortly stalked; capsules globose—

e.g., *P. vittata, P. Kingii.*

Section 18. *Cordifoliæ*, Pax (5 species). Glabrous or nearly so; leaves cordate at base, petiolate; corolla infundibuliform; capsule cylindrical—

e.g., *P. rotundifolia, P. pulchra.*

Section 19. *Sredinskya*, Stein (1 species). Characters as Section 18, but corolla cylindrical—

P. grandis.

Section 20. *Cankriena* (*de Vriese*), Pax (11 species). Glabrous or nearly so; leaves membraneous or papery, serrate or dentate, narrowed to the petiole; flowers in tiers of umbels; capsule globose—

e.g., *P. japonica, P. Cockburniana.*

Section 21. *Auricula*, Pax (22 species). Leaves more or less coriaceous; flowers in umbels; bracts not leafy. This section is divided by Pax into seven subsections as follows:

Euauricula, Pax (2 species). Leaves fleshy, entire or dentate; bracts short, broad; calyx short; flowers yellow—

P. Auricula, P. Palinuri.

Brevibracteatæ, Widmer (3 species). Characters of Euauricula, but flowers violet or rose—

P. viscosa, P. marginata, P. carniolica.

Arthritica, Schott (4 species). Leaves coriaceous, entire margin cartilaginous; bracts narrow, elongated; calyx long; flowers rose—

P. Clusiana, P. spectabilis, P. glaucescens, P. Wulfeniana.

Erythrodrosum, Schott (6 species). Leaves fleshy, without farina, dentate, with reddish glandular hairs; bracts short, flowers rose or purple—

e.g., *P. cottia, P. hirsuta.*

Rhopsidium, Schott (4 species). Leaves as in Erythrodrosum, but glandular hairs colourless; bracts elongate; flowers rose or violet—

e.g., *P. Kitaibeliana, P. Allionii.*

Cyanopsis, Schott (2 species), Leaves fleshy, glabrous, sticky; bracts broad; flowers bluish-violet—

P. glutinosa, P. deorum.

Chamæcallis, Schott (1 species). Leaves fleshy, uncate, apex truncate, serrate; bracts elongate; flowers rose—

P. minima.

European Species of Primula, with Synonymy.

[*Plants marked thus * are found in gardens.*]

*Primula acaulis (L.), Hill (Sect. Vernales). Central Europe and Mediterranean Region.

var. *balearica*, Willk. Balearic Is.

*var. *rubra*, Sibth. et Smith. E. Mediterranean Region.

P. alba plena, Hort.=*P. acaulis* form.

P. Allionii, Hauss.=*P. tyrolensis.*

*P. Allionii, Loisel. (Sect. Auricula, Rhopsidium). Maritime Alps.

P. alpestris=*P. elatior* var. *carpathica* f. *subarctica*.

P. alpina, Loisel.=*P. viscosa*.

P. alpina, Salisb.=*P. Auricula*.

P. altaica, Lehm.=*P. farinosa* subsp. *dahurica* var. *intermedia*.

P. altaica, Pall. ex Ledeb.=*P. elatior* var. *Pallasii*.

P. ambigua, Salisb.=*P. elatior*.

P. americana, Rydb.=*P. farinosa*.

P. amœna of some lists, non Marsch=*P. acaulis* var. *rubra*.

*P. apennina, Widmer (Sect. Auricula, Erythrodrosum). Northern Apennines.

P. atropurpurea, Hort.=*P. acaulis*, var. *rubra*.

P. Auricula, All.=*P. marginata*.

P. Auricula, Hill=*P. farinosa*.

*P. Auricula, Linn. (Sect. Auricula Euauricula), Alps and S. Vorarlberg from Dauphiné and Savoy to Lower Austria and Servia.

*var. *Bauhini*, Beck. Alps and Carpathians.

var. *Widmercæ*, Pax. Black Forest.

*var. *Obristii*, Beck. Vorarlberg and W. Carpathians.

*var. *cilata*, Koch. S. Alps and Apennines.

P. Balbisii, Lehm.=*P. Auricula* var. *ciliata*.

P. baldensis, Goiran=*P. spectabilis*.

P. bellunensis, Venzo=*P. Auricula* var. *ciliata*.

P. Benkoiana, Borbas=*P. elatior* var. *carpathica* f. *Benkoiana*.

P. bicolor, Rafin=*P. acaulis*.

P. Bonjeani, Hugu.=*P. pedemontana*.

P. cadinensis, Porta=*P. œnensis*.

P. calycina, Reich.=*P. spectabilis, P. glaucescens,* and *P. Wulfeniana.*

P. Candolleana, Reich.=*P. integrifolia.*

P. canescens, Opiz=*P. officinalis* var. *canescens.*

*P. CARNIOLICA, Jacq. (Sect. Auricula, Brevibracteatæ). Maritime and Cottian Alps.

P. carniolica, Pollini=*P. spectabilis.*

P. carniolica, Wulf.=*P. Wulfeniana.*

P. carpathica, Fuss.=*P. elatior* var. *carpathica.*

P. ciliata, Moretti=*P. Auricula* var. *ciliata.*

P. ciliata, Schrank=*P. hirsuta.*

P. Clusiana, Weiss=*P. Wulfeniana.*

*P. CLUSIANA, Tausch. (Sect. Auricula, Arthritica). Austria.

P. Clusii, Wiest=*P. Clusiana.*

P. Columnæ, Schur=*P. elatior* var. *carpathica* f. *Benkoiana.*

P. Columnæ, Ten.=*P. officinalis* var. *Columnæ.*

P. commutata, Schott=*P. villosa* var. *commutata.*

P. confinis, Schott=*P. hirsuta.*

P. cordifolia, Schur=*P. officinalis* var. *Columnæ.*

P. coronaria, Salis.=*P. officinalis.*

*P. COTTIA, Widmer (Sect. Auricula, Erythrodrosum). Cottian Alps.

P. crenata, Fuss=*P. Auricula.*

P. crenata, Lam.=*P. marginata.*

P. crenata, Salzer=*P. elatior* var. *carpathica.*

P. dahurica, Lehmann=*P. farinosa* subsp. *davurica* var. *intermedia.*

P. danubialis, Richter=*P. elatior.*

P. daonensis, Leyb.=*P. œnensis.*

P. davurica, Spreng.=*P. farinosa* var. *davurica.*

P. decipiens, Stein non Duby=*P. hirsuta.*

P. decora, Sims=*P. hirsuta.*

*P. DEORUM, Velen. (Sect. Auricula, Cyanopsis). Bulgaria.

P. discolor, Schur=*P. officinalis* var. *Columnæ.*

P. dolomitis, Hort.=*P. Auricula* var. *ciliata.*

P. domestica, Hoffm.=*P. officinalis.*

*P. ELATIOR (L.), Hill (Sect. Vernales). Middle Europe.

*var. *carpathica,* Griseb. et Schenk. Carpathians.

*var. *intricata,* Pax. S. European Mountains.

*var. *Pallasii,* Pax. Ural.

P. exaltata, Lehm.=*P. farinosa* subsp. *davurica* var. *intermedia.*

P. exigua, Velnovsky=*P. farinosa* subsp. *davurica* var. *exigua.*

P. exscapa, Hegetschw. et Heer=*P. hirsuta* var. *exscapa.*

*P. FARINOSA, L. (Sect. Farinosæ). Arctic, subarctic, and mountain regions of Northern Temperate Zone (and Andes of South America from Chile to Tierra del Fuego).

*subsp. *davurica,* Spreng. Russia and Bulgaria.

P. farinosa, Griseb=*P. frondosa.*

P. finnmarchica, Jacq.=*P. sibirica* var. *integrifolia.*

P. Fluggeana, Lehm.=*P. elatior* forma *perreiniana.*

P. fragrans, Krause=*P. elatior* forma *fragrans.*

P. Freyeri, Hladnik=*P. carniolica.*

*P. FRONDOSA, Janka (Sect. Farinosæ). N. Thracia.

P. gigantea, Jacq.=*P. farinosa* subsp. *davurica* var. *intermedia.*

P. glabrescens, F. Nylander=*P. stricta.*

P. glandulosa, Bonjean=*P. pedemontana.*

*P. GLAUCESCENS, Moretti (Sect. Auricula, Arthritica). S.E. Vorarlberg.

*subsp. *calycina* (Duby), Pax. Bergamasker Alps and Giudicaria.

*subsp. *longobarda* (Porta), Widmer. Giudicaria and Bergamasker Alps.

P. glaucescens, Reischb.=*P. spectabilis* and *P. Wulfeniana*.

P. glutinosa, All.=*P. Allionii*.

*P. GLUTINOSA, Wulfen. (Sect. Auricula, Cyanopsis.) E. Central Alps.

P. grandiflora, Bast.=*P. carniolica*.

P. grandiflora, Lam.=*P. acaulis*.

P. graveolens, Hegetschw. et Heer=*P. viscosa* var. *graveolens*.

*P. HIRSUTA, All. (Sect. Auricula, Erythrodrosum). Pyrenees, Central Alps, and South Tyrol.

var. *angustata*, Widmer. Rhætian Alps.

var. *exscapa*, Pax. Mount Javernaz.

*var. *nivea*, Sims. Garden form.

P. hirsuta, Arcangeli=*P. apennina*.

P. hirsuta, Reichb.=*P. villosa* subsp. *Jacquini*.

P. hirsuta, Vill.=*P. viscosa*.

P. Hornemanniana, Lehmann=*P. farinosa* var. *Hornemanniana*.

P. hybrida, Schrank=*P. acaulis*.

P. incana, Jones=*P. farinosa* var. *genuina*.

P. incisa, Lam.=*P. integrifolia*.

P. inflata, Duby=*P. officinalis* var. *canescens*.

P. inflata, Lehmann=*P. officinalis* var. *macrocalyx*.

P. inodora, Gilib.=*P. elatior*.

*P. INTEGRIFOLIA, L. (Sect. Auricula, Rhopsidium). Pyrenees and Central Alps.

P. integrifolia, Oeder=*P. sibirica* var. *integrifolia*.

P. integrifolia, Reichb.=*P. Wulfeniana*.

P. integrifolia, Scopoli=*P. carniolica*.

P. integrifolia, Tausch.=*P. spectabilis*.

P. integrifolia, Vis.=*P. Kitaibeliana*.

P. DEORUM, VELEN.

P. intermedia, Ledeb.=*P. sibirica* var. *arctica.*

P. intermedia, Sims=*P. farinosa* subsp. *davurica* var. *intermedia.*

P. intricata, Godr. et Gren.=*P. elatior* var. *intricata.*

P. intricata, Janka=*P. elatior* var. *carpathica* f. *subarctica.*

P. intrusa, Reichb.=*P. sibirica* var. *integrifolia.*

P. Jellenkiana, Freyer=*P. carniolica.*

*P. KITAIBELIANA, Schott (Sect. Auricula, Rhopsidium). Illyrian Alps.

P. lævigata, Duby=*P. glaucescens.*

P. latifolia, Lapeyr=*P. viscosa.*

P. lepida, Duby=*P. farinosa* subsp. *davurica* var. *intermedia.*

*P. LEUCOPHYLLA var. *longipes*, Pax. (Sect. Vernales). E. Carpathians.

P. lilacina, Hort.=*P. acaulis* var. *rubra.*

*P. LONGIFLORA, All. (Sect. Farinosæ). Alps, Carpathians, Bosnia, and Bulgaria.

P. longiscapa, Ledeb.=*P. farinosa* subsp. *davurica* var. *intermedia.*

P. longobarda, Porta=*P. glaucescens* var. *longobarda.*

P. lutea, Vill.=*P. Auricula.*

P. lutea plena, Hort.=*P. acaulis* form.

P. macrocalyx, Bunge=*P. officinalis* var. *macrocalyx.*

P. macrocalyx, Schur=*P. officinalis* var. *canescens.*

*P. MARGINATA, Curtis (Sect. Auricula, Brevibracteatæ). Maritime and Cottian Alps.

P. microcalyx, Lehmann=*P. marginata.*

*P. MINIMA, Linn. (Sect. Auricula, Chamæcallis). Riesengebirge, E. Alps, Carpathians, Bulgaria, and Thracia.

P. montana, Opiz=*P. elatior.*

P. montana, Reuter=*P. officinalis.*
P. montana, Schur=*P. elatior* var. *carpathica* f. *subarctica.*
P. multiceps, Freyer=*P. carniolica.*
P. Nelsoni, Hort.=*P. hirsuta.*
P. nivalis, Don=*P. Auricula* var. *ciliata.*
P. nivalis, Turcz.=*P. farinosa.*
P. norvegica, Retz.=*P. sibirica* var. *integrifolia.*
P. nutans, Georgi=*P. sibirica* var. *integrifolia.*
P. oblongifolia, Schur=*P. elatior* var. *Benkoiana.*
P. Obristii, Stein=*P. Auricula* var. *Obristii.*
P. odorata, Gilib.=*P. officinalis.*
*P. Œnensis, Thomas (Sect. Auricula, Erythrodrosum). West Rhætian Alps.
*P. officinalis (L.), Hill (Sect. Vernales). Central Europe.
*var. *macrocalyx,* Koch. E. Prussia, Middle Russia eastwards.
*var. *canescens,* Beck. E. and Mid. Europe.
*var. *Columnæ,* Pax. S. Europe.
P. pachyscapa, Goiran=*P. elatior* var. *intricata.*
*P. Palinuri, Petagna. (Sect. Auricula, Euauriculæ). Salerno, Italy.
P. Pallasii, Lehmann=*P. elatior* var. *Pallasii.*
P. pallida, Schott=*P. hirsuta.*
P. pannonica, Kerner=*P. officinalis* var. *canescens.*
P. Parlatorei, Caruel=*P. spectabilis.*
*P. pedemontana, Thomas (Sect. Auricula, Erythrodrosum). Cottian and Graian Alps.
P. Perreiniana, Flügge=*P. elatior* var. *perreiniana.*
P. pistillaris, Hoffmannsegg=*P. officinalis.*
P. Plantæ, Brügger=*P. œnensis.*
P. Polloniana, Moretti=*P. spectabilis.*

P. Pooliana, Brügger=*P. œnensis.*
P. pubescens, Loisel.=*P. hirsuta.*
P pubescens, Reichb.=*P. pedemontana.*
P. purpurea, Hort.=*P. acaulis* var. *rubra.*
P. pyrenaica, Miegeville=*P. officinalis* var. *Columnœ.*
P. rosea, Hort. (non Royle)=*P. acaulis* var. *rubra.*
P. rotundifolia, Pallas=*P. sibirica* var. *integrifolia.*
P. Sauteri, Schultz=*P. minima.*
P. scotica, W. J. Hook=*P. farinosa.*
P. SIBIRICA var. *integrifolia,* Pax (Sect. Farinosæ). Arctic Europe.
var. *arctica,* Pax. Russia, Lapland, N. Russia.
P. Sibthorpii, Hoffmannsegg=*P. acaulis* var. *rubra.*
P. similis, Stein=*P. Auricula* var. *Obristii.*
P. Simsii, Sweet=*P. villosa* var. *Jacquinii.*
P. spectabilis, Josch=*P. Wulfeniana.*
P. spectabilis, Mert. et Koch=*P. Clusiana.*
*P. SPECTABILIS, Tratt. (Sect. Auricula, Erythrodrosum). Giudicaria and Veronese Alps.
P. stelviana, Vulp.=*P. œnensis.*
*P. STRICTA, Hornem. (Sect. Farinosæ). Norway, N. Sweden, Lapland, N. Russia.
P. suaveolens, Bertol=*P. officinalis* var. *Columnœ.*
P. suaveolens, Radde=*P. officinalis* var. *macrocalyx* form.
P. subarctica, Schur=*P. elatior* var. *carpathica* f. *subarctica.*
P. sylvestris, Scop.=*P. acaulis.*
*P. TYROLENSIS, Schott (Sect. Auricula, Rhopsidium). S. Tyrol.
P. undulata, Fisch.=*P. farinosa* subsp. *davurica* var. *intermedia.*
P. uniflora, Gmel.=*P. acaulis.*
P. uralensis, Fisch.=*P. officinalis* var. *macrocalyx.*

P. veris, L.=*P. officinalis.*
P. veris, Oeder=*P. elatior.*
P. vernalis, Salisb.=*P. acaulis.*
P. villosa, Curtis=*P. hirsuta.*
*P. VILLOSA, Jacq. (Sect. Auricula, Erythrodrosum). E. Alps.
*subsp. *Jacquinii.* E. Alps.
subsp. *commutata.* Steiermark.
P. villosa, Parl.=*P. cottia.*
*P. VISCOSA, All. (Sect. Auricula, Brevibracteatæ). E. Pyrenees, W. and Rhætian Alps.
P. viscosa, Vill.=*P. hirsuta.*
P. viscosa, Walsdt. et Kit.=*P. Kitaibeliana.*
P. vulgaris, Hudson=*P. acaulis.*
P. Warei, Stein=*P. farinosa.*
*P. WULFENIANA, Schott (Sect. Auricula, Arthritica). E. Alps.

CHAPTER III

SECTION VERNALES

Bibliography and Synonymy, Key to Species—P. elatior (L.), Hill, P. leucophylla, Pax, P. acaulis (L.), Hill, P. officinalis (L.), Hill.

Section Vernales, Pax.

Bibliography and Synonymy.—*Vernales,* Pax in Engler's Bot. Jahrb., X. (1889), 177.—Section *Primulastrum,* Duby in D C. Prodr., VIII. (1844), 35 *ex parte.*—Section *Euprimula,* Schott, Sipp. Oesterr. Prim. (1851), 10.

Key to the Species.

A. Limb of the corolla flat.

(*a*) With a distinct scape.

Calyx lobes narrowly lanceolate, two or three times shorter than the calyx tube.

Flowers yellow.

1. Leaves green or ashy-green beneath. *P. elatior.*
2. Leaves covered with white tomentum below. *P. leucophylla.*

(*b*) Without scapes. Flowers large, from 20 to 35 mm. in diameter.

(i.) Leaves without white tomentum underneath.

Corolla limb from 30 to 35 mm. in diameter, tube little more than the length of the calyx. *P. acaulis.*

(ii.) Leaves with white tomentum underneath.

B. Limb of corolla concave, calyx openly campanulate, obtuse. *P. officinalis.*

Primula elatior L. (Oxlip).

Bibliography and Synonymy.—*P. elatior* (L.), Hill, Veget. Syst., VIII. (1765), 25; Jacq., Misc. Austr., I. (1778), 158; Lehm., Monogr. Primul. (1817), 33; Duby in D C. Prodr., VIII. (1844), 36, excl. var. B.; Pax in Engler's Bot. Jahrb., X. (1889), 178; Widmer, Europ. Art. Prim. (1891), 127.—*P. veris* var. *elatior* L., Spec. Pl., ed. 1 (1753), I. 143.

Variety *genuina,* Pax in Engler's Bot. Jahrb., X. (1889), 178.—*P. elatior,* Schmidt, Fl. Boehm., II. (1793), 42; Koch, Synops. Fl. Germ., ed. 1 (1837), 587; Ledeb., Fl. Ross., III. (1847–49), 9 *ex parte;* Godron and Grenier, Fl. France, II. (1852), 450; Reichb., Iconogr., XVII. (1855), 35, t. 49, f. 1; Willkomm and Lange, Prodr. Fl. Hisp., II. (1870), 637; Christy in Journ. Linn. Soc., XXXIII. (1897), 172.—*P. veris,* Oeder, Fl. Danica (1770), t. 433.—*P. inodora,* Gilib., Fl. Lithuan., I. (1781), 32.—*P. ambigua,* Salisb., Prodr. Stirp. Chapel Allerton (1796), 117.—*P. montana,* Opiz, Naturalient. (1825), 225.—*P. danubialis,* C. Richter in Abh. Zool. Bot. Ges. Wien (1888), 219.

Leaves oval or oblong, attenuated or contracted into broad-winged petioles, very rugose. Calyx lobe triangular, acute. Capsule cylindrical, protruding above the calyx. Form *typica* of Pax is form *primaria.*

A native of Middle Europe.

Varieties of P. elatior.

The following varieties of P. elatior have been described, but they differ, as a rule, very little from the type. There are many synonyms, but no good purpose would be served by giving them.

Form fragrans (Pax), flowers fragrant, deep yellow.

colorata (Pax), a garden form, flowers red.

uniflora (Petermann), scape bearing only one flower.

mirabilis (Celakowsky), a native of Bohemia, flowers in autumn.

calycida (Schube); Perreiniana (Flügge); cordifolia (Rupr.).

Pallasii (Lehm.); intricata (Godr. and Gren.); carpathica (Fuss.); subarctica (Pax); Benkoiana (Borbas).

dialypetala (Petermann), a curious form, with the corolla deeply 5-parted—rare.

Flueggeana (Lehmann), flowers purple, calyx cut to the base. A curious form said to grow wild in Spain.

Primula elatior.

It is a moot point with some whether P. elatior, the Oxlip, is a hybrid between the Primrose, P. vulgaris, and the Cowslip, P. officinalis, or a natural species, those who hold the former view asserting that P. elatior is only found where both the Primrose and Cowslip grow together. This is not admitted, however, by those who have studied the plants over a wide range of habitats.

In some respects P. elatior resembles both of its allies, and it is noticeable that it has the blades of the leaves,

which are toothed and wrinkled, like those of the Cowslip, while the winged petioles resemble those of the Primrose. What is accepted as the typical P. elatior has the flowers in peduncled umbels, either drooping or horizontal, generally the former, pale yellow, scentless, the corolla limb being without folds. The calyx of P. elatior is more villous than that of P. officinalis, while it has not the bosses which are so evident in the throat of the Cowslip and Primrose. The generally accepted view that the flowers of the Oxlip are horizontal is not borne out by comparison of many true Oxlips, as some of them have the bloom drooping more or less after the manner of the Cowslip. The Bardfield Oxlip, found in quantity in the Bardfield district of Essex, from whence it derives its name, and the Normandy Oxlip, both geographical varieties, may be taken as good types of the wild P. elatior.

The illustration (Fig. 1) gives a general idea of the two plants, which differ in the following aspects: The leaves of the Bardfield one are darker in colour and more crinkled, and the pubescence is much shorter both on leaves and stem. The flowers are deeper in colour, and flatter. The forms known as carpathica, from the Carpathians, intricata from the South European mountains, and Pallasii, found in the Ural Mountains, differ little, if at all, from specimens of the common Oxlip collected in various localities. While the colour of the Oxlip is, as has been described, pale yellow, a number of garden forms have been raised from seeds, and the strains of these, with large flowers, and with colours ranging from pale yellow to orange of various shades of crimson and scarlet, have been secured. Some quaint hose-in-hose varieties also exist, although now rare in

NORMANDY OXLIP. BARDFIELD OXLIP.

PRIMULA LEUCOPHYLLA, PAX.

(The Caucasian Oxlip, found also in the E. Carpathians.)

cultivation. These were formerly much sought after, and such varieties as the old yellow hose-in-hose "Proliferous Oxlip" of the old writers have been highly prized by amateurs and lovers of the curious.

The Oxlip is found in most parts of the British Isles, but grows more profusely in Suffolk, Cambridge, and Essex. It has also a wide distribution in the cooler regions of the North Temperate Zone. The Oxlip flowers in April and May, and will grow and increase rapidly in any good garden soil; in fact, if left alone, it will speedily take possession of the entire garden. It crosses readily with the Caucasian Primrose, Primula Juliæ, and some very pretty coloured hybrids are now in commerce.

It is not surprising that the Oxlip is the subject of so little folk or other lore in our literature. It has always been considerably confused with the Cowslip, and undoubtedly much of the superstition and virtue ascribed to the latter was attached to the Oxlip as well. Parkinson applies both "Cowslip" and "Oxlip" to the same flowers, so there is no wonder that some confusion between the two plants exists. The name of Oxlip is, undoubtedly, an old one, as Gerard speaks of "Field Oxlips," and Cotgrave, in his "Dictionarie" of 1611, mentions "Arthetiques: Cowslips or Oxlips," with the usual laxity of spelling so prevalent in those days. Parkinson spells the name impartially as Oxlips or Oxlippes. Rea, in his "Flora," discriminates by speaking of the Oxlips being bigger than the Cowslip. Old herbalists called it Paralysis Major; Paralysis odora aut Vix odora; Virbasculum pratense; and Sylvaticum inodora (see Hill's "Eden," 1757).

Primula leucophylla, Pax.

Bibliography and Synonymy.—*P. leucophylla,* Pax, in Oesterr. Bot. Zeitschr., XLVII. (1897), 194.

Leaves petiolate, rugose, subcoriaceous, elliptical or oblong, obtuse, with the leaf contracting into a petiole shorter than or equal to the blade. They are obtuse, crenulate, or almost entire, covered underneath with a hairy tomentum, from 4 to 6 cm. long, and 3 to 5 cm. broad, increasing after the flowering season. Scape pubescent, afterwards becoming smooth, longer than the leaves, bearing a many-flowered umbel of yellow flowers, and reaching to a height of from 10 to 15 cm., later becoming taller. Bracts small, linear, acute. Pedicles nearly 1 cm. long, sometimes shorter. Calyx from 8 to 10 mm. long, with short hairs and narrowly tubular; lobes short, lanceolate, acute, two or three times shorter than the tube of the calyx. Corolla pale yellow, with a cylindrical tube, a very little longer than the calyx, the limb of the corolla being about 2 cm. in diameter, with obcordate emarginate lobes. Seed vessel cylindrical, a little longer than, or as long as, the calyx. It resembles P. elatior, but differs by the leaves being thicker in consistency, and by the remarkable hairiness of the underside of the leaves.

Variety longipes, Pax.—Petiole at first equal to the lamina, but lengthening about the time of flowering. Lamina deeply crisped and crenulate. From the Eastern Carpathians, on the upper sandstone of the old strata, and on grassy alpine slopes up to a height of 1,900 metres.

Primula acaulis, Linn.

Bibliography and Synonymy.—*P. acaulis* (L.), Hill, Veget. Syst., VIII. (1765), 25; Oeder, Fl. Dan. (1767), 194; Jacq., Misc. Austr., I. (1778), 158; Schmidt, Fl. Boem., II. (1793), 43, t. 167; Lehmann, Monogr. Prim. (1817), 30; Koch, Synops. Fl. Germ. ed. 1 (1837), 587; Ledeb., Fl. Ross., III. (1847–49), 10; Regel, in Acta Horti. Petropol., III. (1874), 133; Boiss, Fl. Orient., IV. (1879), 24; Pax, in Engler's Bot. Jahrb., X. (1889), 180; Widmer, in Europ. Art. Primul. (1891), 126; Kusnetzow, Fl. Cauc. Crit., IV. (1901), 76; Halácsy, Consp. Fl. Græcæ, III. (1904), 6.—*P. veris* var. *acaulis* (L.), Spec. Pl., ed. 1 (1753), I., 143.—*P. vulgaris*, Hudson, Fl. Angl. ed. 1 (1762), 70; Willkomm and Lange, Prodr. Fl. Hisp., II. (1870), 637; Caruel, in Parlat. Fl. Ital., VIII. (1889), 607; T. G. Hill, in Ann. of Bot., XVI. (1902), 319.—*P. sylvestris*, Scop., Fl. Carniol., ed. 2 (1772), I., 132; Reichb., Iconogr., XVII. (1855), 41, t. 50, f. II., III.—*P. grandiflora*, Lam., Fl. Franc., II. (1778), 248; Duby, in D C. Prodr., VIII. (1844), 37; Godron and Grenier, Fl. France, II. (1852), 447.—*P. hybrida*, Schrank, Bayr. Fl. (1789), 449.—*P. vernalis*, Salisb., Prodr. Stirp., Chapel Allerton (1796), 117.—*P. uniflora*, Gmel., Fl. Badens., I. (1805), 442; Stokes, Bot. Mat. Med., I. (1812), 290.—*P. bicolor*, Rafinesque, Caratt. g. Nouov. Gen. 78 (1810).

Flowers usually pale yellow, with a flat limb; calyx tube inflated; 5-angled; lobes acuminate; umbels sessile, giving the appearance of being solitary. Leaves tufted, sessile. Height 3 inches.

Variety *a*, *genuina*, Pax=*P. acaulis* var. *parviflora* and var. *grandiflora*, C. Koch, in Linnæa, XXIII. (1850), 618.

Leaves pilose and greenish below. Flowers pale yellow or sulphur, rarely white (*P.* form *lactea*, Ljungstrom).

Widely spread throughout Europe, and generally found in the shade of woods and copses, and in moist soil.

Variety *β*, *balearica*, Willkomm, in Linnæa, XL. (1876), 75; Illustr. Fl. Hisp., I. (1881–85), 52, t. 35; Pax, in Engler's Bot. Jahrb., X. (1889), 181; Widmer, Europ. Art. Prim. (1891), 127.

Leaves almost glabrous below. Flowers whitish. Balearic Isles, rocky places in mountains, and sub-alpine regions.

Variety *γ*, *rubra*, Sibth. and Smith, Fl. Græc., II. (1813), 70 t. 184; Rupr., in Bull. Acad. St. Petersb., VI. (1863), 221; Halácsy, Consp. Fl. Græc., III. (1904), 6.—*P. amœna* var. *acaulis*, Marsch, Bieb., Fl. Taur. Cauc., I. (1808), 138.—*P. amœna* var. *Sibthorpii*, C. Koch, in Linnæa, XVII. (1843), XVII. (1843), 307.—*P. acaulis* var. *iberica*, G. F. Hoffmann, Hortus Mosquens (1808), n. 2594 (from Ruprecht and Kusnetzow).—*P. Sibthorpii*, Hoffmannsegg, Preiseverzeichnis (1824), 189; Reichb., Fl. Germ. Excurs. (1830), 402; Caruel, in Parlat. Fl. Ital., VIII. (1889), 610.—*P. acaulis* var. *Sibthorpii*, Pax, in Engler's Jahrb. Bot., X. (1889), 181; Widmer, Europ. Art. Primul. (1891), 127; Kusnetzow, Fl. Cauc. Critic., IV. (1901), 78.—*P. acaulis* var. *rosea*, Boiss., Fl. Orient., IV. (1879), 24.—*P. acaulis* var. *colorata*, Ljungstrom, in Bot. Centralbl., XXXV. (1888), 181.—*P. grandiflora* var. *fl. purpurea*, Duby, in D C. Prodr., VIII. (1844), 37.—*P. grandiflora* var. *orientalis*, C. Koch, in Sched.

Flowers purple, rose, or reddish-pink.

Primula acaulis.

The common Primrose is a flower which every Briton knows at sight, and which thrills the heart alike of cultured botanist and veriest ignoramus who never dreamt of such a name as Primula acaulis, or vulgaris, as some would have it. We seek it in the days of spring on the moist, grassy bank, in the woodland, or by the meandering stream, and, plucking a few to make a posy, we wear the flowers we love, caring not that they are but "common" Primroses. We are glad because we may find the Primrose in well-nigh all the counties of Britain, or, as a matter or fact, almost throughout Europe, except in the north-east, and as we study the flower we do not marvel that it has been made the subject of rapturous poems and noble prose. The Primrose in our gardens has, in response to skilful attention, assumed characteristics distinct from the wildings of the meadow and woodland, and the pale yellow has been augmented by pink, lilac, scarlet, crimson, and even blue. The size and form of the flowers, too, has been improved, according to the idea of the florist, and we have circular in place of starry flowers, borne on longer and stouter stems, throwing the flower-heads well up above the foliage. Perhaps the most handsome of the yellow varieties is that named "Evelyn Arkwright," which has flowers of magnificent form and size, and of a lovely yellow, but it is pin-eyed, this, of course, being the technical term indicating that the style is longer than the florist ordains it should be, protruding above the anthers. Harbinger is a good white variety which comes into bloom very early, but some prefer Munstead Early White, raised by Miss Gertrude Jekyll, which is certainly

very charming for spring bedding schemes. Two good rich velvety reds are Miss Massey and auriculæflora, and, of course, the double Primroses have been cherished for years, but are never over-plentiful, because they are far from robust in constitution, and successful cultivation is in fact something of which one may justly be proud. The great aim should be to choose a partially shaded situation, where the soil is deep and of good heart, and well drained. Then see that during the flowering and growing season the plants are never lacking abundant moisture, and give periodically soakings of weak liquid manure. Gather some of the flowers when the plants are heavily bearing, to prevent exhaustion, and in winter adopt some method of warding off excessive rains. Don't leave old clumps too long without division and replanting. Thus managed, double Primroses should thrive. If this treatment does not meet with success, plant them in stiff soil among the gooseberry bushes where the shade is dense, and it will be found that they not only grow but flourish.

The double Primroses generally in cultivation include the following:

amarinthina Fl. Pl. (Red Paddy). Bright rose crimson.
Burgundy. Crimson purple, streaked white.
carnea plena. Flesh-coloured.
Crouseii Plena. Deep lilac rose, edged white.
Cloth of Gold (lutea plena).
French Grey.
platypetala plena (A. Dumoullin). Mauve violet, tipped white.
Pompadour. Deep ruby velvet, very scarce.

Lilac. Good free-flowering.
Rose.
Sulphur. Early.
White. Fine early.
sanguina plena.
Carmine rose. Margin white.
Old rose. Much stronger and easier to grow than Carnea Plena.

Several new double varieties have been raised, and we may confidently anticipate the appearance shortly of some handsome varieties with double flowers and more vigorous growth than the older favourites. Much of the improvement effected has been due to the consideration and adoption of the Mendelian system, by which in the third generation double flowers are produced from single varieties fertilised by the pollen of double Primroses.

Whether or not the early raisers adopted this method of raising double-flowered varieties I cannot say, but in my own garden I have worked on these lines and have found it consistently successful, and I recommend any reader who has a desire and the facilities to produce new double Primroses and Polyanthuses to adhere to this course, or, at all events, to try the experiment.

Both single and double green Primroses are occasionally found. In cultivation they are difficult to keep. The only way I have been able to get them to survive is to grow them in a situation where they get no sun.

Primula Sibthorpii, Hoffmannsegg.

Considerable interest attaches to this plant, which is the Caucasian form of P. acaulis, the ordinary type of which, though familiar in other parts of Europe, is

seldom met with in the Caucasus. P. Sibthorpii is also found in Greece and Northern Persia, but the point of interest lies in the fact that this plant is unquestionably the original source of varieties in colour of the Primrose, or, in other words, P. Sibthorpii is a parent of all our coloured Primroses. The colour of the flowers ranges from purple to rose and reddish-pink.

It flowers in February, and does not fear to display its cheery head even when the ground is carpeted with snow. Few things are more striking than the sight of the purple or rosy flowers of this plant shimmering in the breeze of a cold, wintry morning against the white blanket which throws their colour into strong relief.

Obviously it is wise to select a fairly sheltered spot for such a plant, the foot of a hedge-bank or the leeward side of a projecting boulder on the rockery being suitable environments.

In Curtis's *Botanical Magazine*, Table XXIX. (1794), is figured what is asserted to be a double form of the typical P. Sibthorpii.

Primula amœna, Bieb.

This plant was introduced into Britain in 1831, but, alas! it has disappeared from present-day collections. This is much to be regretted, as it is a delightful Primula, much superior to many others that are fancied. It has a scape 3 to 4 inches high, with an umbel of violet-blue flowers. P. amœna, Bieb., was flowered in 1833 in the garden of the late Dr. Neill at Canon Mills, Edinburgh (of which a figure appeared in the *Botanical Magazine* of that year), and produced an umbel with as many as eighteen flowers. It is found in the Caucasus and Armenia, but not in Europe, so perhaps it may be con-

sidered an error to include it in this book, but my reason for doing so is that many catalogues list it. The plant sold under the name is nothing more than the common early lilac Primrose, which is also sent out by some firms as P. altaica. I should be very pleased to see the return of Primula amœna genuina to British gardens, but until we can secure the real thing it is surely politic to delete the name from catalogues.

The Blue Primrose.

Blue is the least common of all colours among flowers, and at the same time—largely, no doubt, by reason of its rarity—held in high esteem. Hybridists have, in their efforts to introduce new shades of colour into some particular plant, generally found their most difficult task when striving to introduce a blue variety, and it will be realised, if a little thought is exercised, that wherever yellow is the predominating colour in a genus, and red also fairly strong, blue forms and varieties are almost, if not entirely, non-existent. A blue Primrose was long desired, and for many years a number of raisers of Primroses made strenuous efforts directed to this end, and for a time seemingly in vain. With rare tenacity of purpose, however, and with skill born of keen enthusiasm, the late Mr. G. F. Wilson, of Oakwood, Wisley, eventually succeeded in producing a plant which justified description as a blue Primrose; and great was that ardent gentleman's delight, and great also was the enthusiasm of many other florists, when, about the year 1889, he showed a few Primroses of his creation at the Royal Horticultural Society's meetings. Mr. Wilson did much for horticulture, and achieved success with many things in his remarkable

garden, which is now in possession of the Royal Horticultural Society; but had he done nothing more than give us the blue Primrose, he would have earned our lasting gratitude.

Opinions differ as to the real origin of Wilson's blue Primroses, and there is uncertainty as to the precise lines upon which he worked to produce them, for modesty, rather than designed secrecy, made him very reticent in regard to his own work. Miss Gertrude Jekyll, however, in the course of her paper read at the Primula Conference, April 16, 1913, stated that "it was from a purple Primrose with a colour inclining to violet that Mr. G. F. Wilson raised his celebrated blue varieties." Miss Jekyll is not one to make a statement without a knowledge of its accuracy, and bearing in mind that she was in touch with the developments of the Primrose at the time, I consider we are justified in accepting as conclusive the parentage she indicated. Furthermore, there is corroborative evidence in the presence of a purple-red ring at the base of the corolla of the earlier varieties of the blue Primrose, but this feature has been wellnigh eliminated in more modern varieties which have resulted from the efforts of other raisers to improve the flower—efforts, it may be said, which have met with gratifying success.

A valuable characteristic of blue Primroses is their readiness to flower during the winter, a point of especial interest to gardeners living in districts where winters are fairly mild and open.

It is the winter-flowering propensity which has given colour to the contention of those who credit P. Sibthorpii, Hoffmannsegg, with the parentage of the blue Primrose, this plant also exhibiting a strong tendency to bloom in winter.

Polyanthus-Primroses.

An interesting and useful class of Primula is that which is generally called the Polyanthus-Primrose. This is practically intermediate between the Primrose and the Polyanthus.

The first flowers which are produced are of the Primrose type, and are borne singly on the pedicels from amid the leaves. These are followed by the bunch flowers of the Polyanthus. The trusses of the Polyanthus-Primrose are not so fine as those of the real Polyanthus, being smaller, while individually the pips are not usually so large or well formed as in the best strains of the large-flowered Polyanthus. It is frequently possible to obtain a picking of flowers from these Polyanthus-Primroses earlier than from the Polyanthus alone, and some cultivators find them useful on this account.

The Polyanthus.

The precise origin of the Polyanthus is not at all certain, and authorities of value have differed very considerably on the subject. In the opinion of some it is simply a descendant of the Primrose, whose scape is present, although not apparent, in the plant. This theory has, however, been largely abandoned, and the general belief is that it was obtained from a hybrid between P. acaulis, the Primrose, and P. officinalis, the Cowslip. It has been in cultivation for very many years, and the florist's Polyanthus has long been a great favourite with the orthodox fanciers, who appraise the merits of a flower by the aid of a code of "points." The border varieties have been much improved, and are now taller and finer in every way. It is quite likely, from the

illustrations shown in some of the old herbals and gardening books, that the Polyanthus was in cultivation in the time of Parkinson and Gerard, although these writers did not distinguish it by name from the Cowslip and Oxlip.

It resembles the Cowslip and Oxlip in having a distinct scape bearing a number of flowers at the summit, but, while those of the Cowslip are drooping and of the Oxlip one-sided, those of the Polyanthus are open and arranged in a flattish truss at the top of the stems.

Blue Polyanthuses.

The blue-flowered Polyanthus has soon followed the blue Primrose, and it may fittingly be mentioned among the garden Polyanthuses. It is an attractive flower, somewhat varied in the shade of blue, and is specially beautiful for cultivating in pots under glass, where its trusses are brought into close view and their subtle charms revealed more clearly than when grown in the open ground. However, it must always be borne in mind that it is in no wise a subject for coddling treatment, the glass protection being primarily for preserving the colour from damage through vagaries of the weather.

Double Polyanthuses.

There are some interesting flowers among the double Polyanthuses, although these are few in number and are more enticing to those who love curiosities than to those who desire effective garden plants. Double Polyanthuses are not flowers which can stand neglect, and they should be frequently divided and looked after to see that they do not grow too far out of the soil. Where choice plants

of the Primula family are cultivated in pots, these double Polyanthuses ought to have the same treatment. They are hardy enough, but require little attentions such as indicated above, and must not be left to take their chance even when not in bloom.

Some of the double forms or varieties are very old plants, but it is impossible to ascertain the exact time of their introduction. Rea describes double Cowslips, but, as he does not describe any Polyanthuses by name, it is possible that one or two of his double Cowslips were Polyanthuses.

Of the varieties in commerce we may name one called Curiosity, occasionally called Golden Pheasant. This has, as the second name would indicate, prettily marked double flowers of mingled yellow and red.

Derncleugh, occasionally called Derncleughi, but frequently Tortoiseshell, has the red of a deeper hue than Curiosity; it is nearer a crimson brown, and it contrasts well with the golden markings with which the flower is adorned. This is a good old variety of much beauty.

Harlequin is a favourite with many. It has good flowers of crimson, each petal being tipped with white in an attractive way. Rex Theodore has flowers of a deep black crimson, charmingly laced with gold.

Prince Silverwings is another double variety, which has purple flowers distinctly edged with white.

Double Blue is a novelty of considerable beauty which appeals to the many admirers of blue flowers.

The Florists' Polyanthus.

One of the Primula race which for many years secured the almost undivided care of a number of the older florists was the Polyanthus, but not the bold and gay

border Polyanthus which gives so much brilliancy to the gardens of the present day. It was the gold-laced Polyanthus, so called from the perfectly formed lacing or narrow bordering of gold which surrounded each segment of the bloom. It was from a comparatively early date prized by the florist, and its special points of merit were laid down with exactitude. It is difficult to trace its precise evolution, but the gold-laced Polyanthus does not appear to be mentioned by Parkinson. In the time of Abercrombie, who wrote in 1778, the Polyanthus must have been cultivated, for his description of several points that were recognised by cultivators would indicate that some of the gold-laced varieties, or others at least approaching them, were in cultivation. Abercrombie remarks that "the Polyanthus is one of the noted prize flowers among florists, many of whom are remarkably industrious in raising a considerable number of different sorts." He continues: "A Polyanthus must contain several particular properties to have admission in their choice collections."

Later Maddock, Emmerton, and other florists elaborated the points, but it was left to George Glenny to sum up these properties in their highest attributes in his book "Properties of Flowers." His statement, though somewhat lengthy, cannot well be omitted. It is as follows:

"*The Pip.*—1. This should be perfectly flat and round, slightly scalloped on the edge, and three-quarters of an inch diameter.

"2. It should be divided in (five or) six places, apparently forming (five or) six flower-leaves, each indented in the centre to make it a kind of heart-shaped end; but the indentations must not meet the yellow eye.

GOLD-LACED POLYANTHUS.

"3. The indenture in the centre of the apparent flower-leaves should be exactly the same depth as the indenture formed by the join of these flower-leaves, so that it should not be known, by the form of the flower, which is the actual division and which is the indenture; in other words, which is the side and which the centre of the flower-leaf; and all the indentures should be as slight as possible to preserve the character.

"4. The flower should be divided thus: the yellow tube in the centre being measured, the yellow eye, round the tube, should be the same width as its diameter; and the ground colour of the flower should be of the same width; or draw with the compasses."

Rules for Judging.—These are:

Polyanthus, Gold-Laced—

(*a*) Strong straight stem, 4 to 6 inches in length, ½ point.

(*b*) Footstalks of pips just long enough to bring all together in a compact symmetrical whole, ½ point.

(*c*) A truss of not less than five well-expanded flowers, 1 point.

(*d*) The centre pure, without stain, and uniform with that on the edges, 1½ points.

(*e*) The lacing thinly and regularly laid on round each segment, cutting down to the centre, 1½ points.

(*f*) The ground colour red or black, unshaded, and dense, 1 point.

Some authorities have always expressed a preference for a five-petalled flower, as being less lumpy and not so likely to be crimped at the margins.

Lancashire and Cheshire were the great centres for the cultivation of the florists' Polyanthus, and prior to and about the middle of the last century this flower was much

in vogue. It was also largely cultivated about Lanarkshire and Ayrshire, in Scotland, about the same time.

It is with some reluctance that the admission has to be made that, whilst the garden varieties of Polyanthuses have been much improved, the gold-laced section has rather lost than gained ground of late years, and, except in comparatively isolated localities where the old spirit of the florist is still active, good collections are now seldom met with. At one time competition was keen for prizes offered for these refined and fascinating flowers, and the enthusiasm displayed by both professional and amateur florists when pitting their best against those of their comrades was something quite apart from the ordinary admiration of flowers that may by comparison be termed commonplace. Classes for these flowers at present-day shows are frequently but poorly filled, and excite lukewarm interest, and it is not from any desire to disparage the broadened views and more Bohemian tastes we have adopted in our gardening matters of to-day that a feeling of regret is expressed that we have apparently lost some of the old keen perception of the distinct and peculiar charm vested in the nicety of precision and perfection of form and regular proportionment of colour which constitutes the ideals of the true florist. Could we not with advantage revive some of this delightful enthusiasm for the " perfect flower " and exercise again the careful and skilful methods which secure supreme quality in the flowers we love ?

The Primrose: Its Name and Folk-Lore.

It comes as a surprise to the admirer of the Primrose when he learns for the first time that the name was not always applied to our favourite flower, but was at first

indiscriminately used for the earliest spring plants. The Privet would seem to have claimed the title of Primrose, and some of the early accounts which give us the title evidently apply to that shrub. Among the writers who have devoted special attention to the subject has been Canon Ellacombe, whose delightful work on "The Plant Lore and Garden Craft of Shakespeare" is so invaluable to the student of this subject and of those others which bear on allied problems. I am quoting now largely from that work. As Canon Ellacombe remarks, "its name is one of the greatest puzzles to the etymologist," and various writers have exercised their ingenuity to explain it. Dr. Prior says: "The old name was Prime Rolles, or Primerole. Primerole is an abbreviation of Primeverole: It. Primaverola, diminutive of 'prima vera,' from 'flor di prima vera,' the first spring flower. Primerole, as an outlandish unintelligible word, was soon familiarised into Primerolles, and this into Primrose." As Canon Ellacombe shows, the name was not originally applied in England to the flower, but was an old English word to indicate excellence. He quotes Spenser to prove this:

> "A fairer nymph yet never saw mine eie,
> She is the pride and Primrose of the rest."
>
> *Colin Clout.*

and

> "Was not I (the Briar) planted of thine own hande
> To bee the Primrose of all they lande;
> With flowering blossoms to furnish the prime
> And scarlet berries in summer time?"
>
> *Shepherd's Calendar: Februarie.*

Other old references evidently apply to the Privet. A "Nominale" of the fifteenth century says: "hoc Ligustrum, a Primerose." In a Pictorial Vocabulary of the

same century we have "hoc Ligustrum, Ace a Prymrose," and in the "Promptorium Parvulorum" of 1440 we find, "Prymerose, Primula, Calendula, Ligustrum." The "Catholicon Anglicum" of 1483 names: "A Prymerose; Primarosa, Primula veris." Turner's reference is interesting. He says: "Ligustrum arbor est non herba ut literata vulgus credit; nihil que minus est quam a Pryemrose." In Tusser's "Husbandry" in the "September Abstract" we have "set Privie or Prim," and it is quite apparent from the following from the "January Abstract" of the same work that it is the privet of which he was speaking:

"Now set ye may
The Box and Bay
Hawthron and Prim
For clothes trim."

Canon Ellacombe quotes from Gerard and Cole to show that the name was applied to the Privet, and it appears that old botanists called the Daisy Primula vulgaris.

The name of Primrose was evidently firmly attached to our flower in the time of Shakespeare, as will be gathered from his references to it. Parkinson, Rea, and subsequent writers all speak of the Primrose as Primula veris or Primula hortensis, the Cowslip being then generally called Paralysis.

In the glossary in "Stray Leaves from a Border Garden" we find two names for the Primrose which are not usually mentioned. These are Mayspink and Plumrock. "Mayspink" may be compared with the Mayflower of the Shetland Islands, but the origin of Plumrock has up to now baffled the ingenuity of the author and his friends.

The power which weaves together the strands of folk-

lore has not made so much use of the Primrose as of the Cowslip; yet it has not been utterly neglected, and I think I may mention a few points of interest.

In olden days it was one of the flowers used in the bouquets and posies carried by the bride and her attendants at marriage ceremonies.

Like the Cowslip, the Primrose is called Schlüssel-Blume, or Key-flower, in Germany, and it shares also with the Cowslip in that country the alleged virtue of discovering hidden treasure.

A legend relating to this exists in various versions. One of these is as follows: "Holda, or Bertha, entices a favoured child by exquisite Primroses to a doorway overgrown by flowers. This is the door to an enchanted castle. When the Key-flower touches it, the door gently opens, and the favoured mortal passes to a room with vessels covered over with Primroses, in which are treasures of gold or jewels. When the treasure is secured, the Primroses must be replaced, otherwise the finder will be for ever followed by a black dog."

But the Primrose has its less happy associations in the realm of plant lore. It was much employed to strew on graves, and also to dress the corpses in their coffins, as Mrs. Latham tells us. In consequence, it was one of the many flowers of which it was said to be unlucky to take a single one into the house when it first comes into bloom. It represented early youth and premature death, as we learn from the lines in which Spenser tells of the grief of a husband at the death of a young and lovely wife:

> "Mine was the Primrose in the lowly shade!
>
> * * * * *
>
> Oh, that so fair a flow'r so soon should fade,
> And through untimely tempest fade away!"

Of Milton's references—only three, it is believed—to the Primrose, two associate it with death. One of these will be found in "Lycidas":

> "Bring the rathe Primrose that forsaken dies,
> * * * * *
> And every flower that sad embroidery wears."

While the other, from "On the Death of a Fair Infant," gives the Primrose as an emblem of untimely death:

> "O fairest flower, no sooner blown but blasted,
> Soft silken Primrose fading timelessly."

A little-known superstition is recorded to the effect that to find a six-petalled Primrose was lucky, and that the maiden who found one would see her lover soon.

A curious superstition of the same character as that recorded above was given by a correspondent to *Notes and Queries*, in which he said: "My gravity was sorely tried by being called on to settle a quarrel between two old women, arising from one of them having given one Primrose to her neighbour's child, for the purpose of making her hens hatch but one egg out of each set of eggs, and it was seriously maintained that the charm had been successful."

These cursory glimpses at the lore of a bygone and romantic age will prove how strong a hold on the imagination the Primrose had with its suggestions of youth and tenderness, and a certain wistful sadness amid the joyous revel of spring.

The roots of the Primrose act as an emetic, and Gerard reports that a drachm and a half in the powdered state acts strongly and safely.

Parkinson, in his "Paradisus," in which Primroses and

Cowslips are classed together, though under different names, the distinctions being clearly shown in other respects, tells us that " Primroses and Cowslips are in a manner wholly used in Cephalicall diseases, either among other herbes or flowers, or of themselves alone, to ease paines in the head, and is accounted next to Betony, the best for that purpose. Experience likewise hath shewed that they are profitable both for the Palsie and paines of the ioynts, euen as the Beares ears are, which hath caused the names of *Arthritica, Paralysis,* and *Paralytica* to bee giuen them. The iuice of the flower is commended to cleanse the spots or marks of the face, whereof some Gentlewomen have found good experience."

It may be noted that the statement of Parkinson regarding the use of the Primroses and Cowslips for palsy and for spots on the face are probably referable to the Cowslip only. The " doctrine of signatures " was responsible for the employment of the Cowslip.

Joseph Miller, in his " Botanicum Officinale, or a Compendious Herbal, giving an Account of all such Plants as are now used in the Practice of Physick, with their Descriptions and Virtues," published in 1722, states that: " The Flowers are commended by some, as good against Disorders arising from Melancholy and Phlegmatic Humours; the juice of the Root is sometimes used as an Errhine to purge the Head of tough slimy Phlegm."

Culpepper tells us that: " Of the leaves of Primroses is made a fine salve to heal wounds as any I know; you shall be taught to make salves of any herb at the latter end of the book; make this as you are taught there, and do not (you that have ingenuity in you) see your poor neighbours go with wounded limbs when a halfpenny cost will cure them."

Tusser, among the "seeds and herbs for the kitchen," mentions the Primrose, and Lyte informs us that "the Cowslips, Primroses, and Oxlips are now used dayly amongst other pot herbes, but in physicke there is no great account made of them."

In "A History of Gardening in England," we are informed that in the fourteenth and fifteenth centuries Primroses were among the flowers which were employed in cookery, and we infer from what is there said that they were mostly utilised in the preparation of sauces.

Primrose Wine.

There are remarkably few records of the Primrose being made into wine, and most books of household recipes are entirely silent regarding its existence. I have been favoured with the following recipe, and it may prove acceptable, and even useful, to some of my readers, as well as being of interest in other ways. It has been used quite recently, and is quite a pleasant wine.

"To concoct a delicious Primrose Wine, to every gallon of water, one gallon of pips (flowers) and three pounds of loaf sugar are required. Boil the sugar and water together for half an hour, and when it is boiling take off the scum, and put in the white of an egg to clear it; and when it is cool put in a little barm (yeast). Let it stand for three days, stirring it twice a day, and then put it in the barrel on the pips. To every gallon three lemons and one sweet orange cut in thin slices should be added. When all the ingredients are together in the barrel, squeeze them well twice a day for three days, then stop the barrel up close, first adding one ounce of isinglass, and what brandy is deemed requisite. Let the wine stand for a month and then bottle it off."

Primula officinalis, Linn. (Cowslip).

Bibliography and Synonymy.—Linn., Veget. Syst., VIII. (1765), 25; Jacq., Misc. (1778), 159; Duby, in D C. Prodr., VIII. (1844), 36; Pax, in Engler's Bot. Jahrb., X. (1889), 181; Caruel, in Parlatore, Fl. Italian, VIII. (1889), 615; Widmer, Europ. Art. Primul. (1891), 128.—*P. veris* var. *officinalis,* L., Sp. Pl. ed. I., 29 (1753), I., 142.—*P. odorata,* Gilib., Fl. Lithuan., I. (1781), 32; Stobes, Bot. Mat. Med., I. (1812), 291.—*P. coronaria,* Salisb., Prodr. Stirip., Chapel Albert (1796), 117.—*P. domestica,* Hoffmann, Verzeichnis 2 u. 3, Nachtr. (1826), 185 ?—*P. pistillaris,* Hoffmann, Verz. 2 u. 3, Nachtr. (1826), 185 ?—*P. montana,* Reuter ex Nyman, Consp. Fl. Europ., 603 (1878–82).

Description.—Flowers drooping, calyx teeth obtuse; corolla buff yellow, funnel-shaped; limb much cupped; throat open, with obscure folds; flowers odorous. Differs from P. elatior in the short and often glandular pubescence of the pedicels and calyx; shorter pedicels; much smaller corolla; limb and capsule much shorter than the calyx tube. Corolla rarely scarlet or orange brown.

Var. a, genuina.—Pax, in Engler's Bot. Jahrb., X. (1889), 181; Korshinsky, in Mém. Acad. St. Pétersbg., 8 Ser., VII. (1898), 283.—*P. officinalis,* Schmidt, Fl. Boem., II. (1793), 41, t. 165; Koch, Synops. Fl. Germ. ed. 1 (1837), 586; Ledeb., Fl. Ross., III. (1847–49), 8; Gods. et Gren., Fl. France, II., (1852), 448; Reichb., Icon. Fl. Germ., XVII. (1855), 34, t. 49, f. II.; Blytt, Norges. Fl., I. (1861), 823; Fuss, Fl. Transsylv. (1866), 535 *ex parte ;* Schur., Enum. Pl. Transsylv. (1866), 553 *ex parte ;* Boiss, Fl. Orient., IV. (1879), 24; Simonkai, Enum. Fl. Transsylv. (1886), 459 *ex parte ;* Sagorski and Schneider,

Fl. Centralkarp. (1891), 381.—*P. veris*, Oeder, Fl. Dan. (1770), t. 434; Lehm., Monogr. Primul. (1817), 27.

Description.—Leaves contracted into a petiole, tomentose beneath, greenish; calyx funnel-shaped or campanulate, 10 to 15 cm. long. Corolla tube greater than the calyx; limb 9 to 12 mm. in diameter. Form *typica*, Pax=*P. officinalis* var. *micrantha*, Caruel in Parlatore, Fl. Italian, VIII. (1889), 615 ?

Calyx campanulate, funnel-shaped; corolla golden yellow.

A native of Central, Northern, and Southern Europe.

Varieties of the Cowslip.—Of the numerous varieties of the Cowslip, only those called macrocalyx (Bunge), which has a very large calyx, pannonica (Widmer), with leaves contracted gradually into a long petiole, and Columnæ (Ten.), with leaves contracted sharply into a narrow winged petiole and covered with white tomentum, need be illustrated. Others which have been named by botanists, but not of sufficient value to describe, are:

ampliata, Koch; *hortensis*, Pax; *uniflora*, Hennings; *ascapa*, Goir. ex Car.; *autumnalis*, Pax; *calycida*, Schube; *virescens*, Pax; *colchica*, Pax; *alpina*, O. Ktze.; *canescens*, Beck; *calvescans*, Pax; *cinerascens*, Pax; *hardeggensis*, Beck; *composita*, Beck.

Another Shakespearian flower is the Cowslip, Primula officinalis, a native plant, widely distributed in the British Isles, and choosing the open meadow and drier soil than the Primrose or the Oxlip. It is more widely distributed even than the Oxlip, and is met with in regions as wide apart as Western Europe and Eastern Asiatic Siberia, North-West Asia and Northern Africa. Its flowers, which are bright yellow, with red spots at

PRIMULA OFFICINALIS VAR. MACROCALYX, BUNGE.

PRIMULA OFFICINALIS VAR. PANNONICA, WIDMER.

PRIMULA OFFICINALIS VAR. COLUMNÆ, TEN.

the base of each, are drooping and are arranged in one-sided umbels; the calyx lobes are obtuse, and the corolla limb is cup-shaped. The leaves, which are usually less in size than those of the Primrose, are thickly pubescent, with short, stiff hairs, and are narrowed towards the base. It varies in height from 4 to 12 inches, and largely according to the soil and climate. It is interesting to note that P. officinalis is not a colour-changer like P. acaulis and P. elatior, although there is an occasional break away in garden forms seen in scarlet and orange.

There are some very attractive Hose-in-Hose and large-flowered varieties of the most varied colours, besides the curious forms often grouped under the name of macro-calyx. These have the calyx developed into a leafy form and considerably enlarged.

Both the Cowslip and the Primrose have a tendency to abnormal development of the calyx.

The form called Galligaskins has, as Parkinson describes them in his quaint way, the flowers " folded or crumpled at the edges, and the huskes of the flowers bigger than any of the former, more swelling-out in the middle, as it were ribbes, and crumpled on the sides of the huskes, which doe somewhat resemble men's hose that they did weare, and tooke the name of Gallegaskens from thence." To put it more simply, the ribs of the calyx tube are prominent and crimped, and the segments of the calyx are developed into large foliaceous blades crisped or curled on the margin. Parkinson also gives them the name of " Curled Cowslips." Jackanapes-on-Horseback is one of the most singular of the Galligaskin type, and has the involucral bracts at the top of the scape produced into long, narrow leaves an inch or more in length, from the centre of which rises an umbel of single-flowered

pedicels. Pantaloons are forms of the Cowslip or the Polyanthus with enlarged, rather funnel-shaped calyces, which are coloured like the corolla, but are also variegated with green stripes. Another name of the Pantaloon is Jack-in-the-Green or Jack-in-the-Box.

Some of the garden varieties raised from seeds are very attractive, especially those which have Hose-in-Hose flowers. Seedlings do not come absolutely true to the parents among these Hose-in-Hose varieties, but a considerable proportion will do so.

Variegated-leaved Cowslips occasionally appear.

The Cowslip is very easily cultivated in common soil in the garden, and may be naturalised in meadows or on grassy banks. It flowers a little later than the Oxlip.

The Cowslip.—The popular name of Primula veris—Cowslip—has afforded material for a considerable amount of discussion by philologists specially interested in plant names. It is a very old one, and is to be found as far back as 1440, when we find the plant mentioned in "Promptorium Parvulorum" as "Cowslope, herbe; Herba petri, herba paralysis, ligustra." In 1483, in "Catholicon Anglicum," it appears as "A Cowslope, ligustrum, vaccinium." Turner, in his "Names of Herbes," in 1548, and again in his "Herbal" of 1568, speaks of this Primula as "Cowslop" and "Cowslip."

Matthiolus, in the "New Kreutebuch," published in Prague in 1563, p. 503, chap. xiv., gives two coloured woodcuts of Cowslips. That marked I. is "Cowslips, Herba Paralysis alias Primula veris"; and the second "Cowslips Herba Paralysis."

He says of these: "Schlüsselblumen (Cowslips) are also called Himmelschlüssel (Keys of Heaven), Peter's Schlüssel (Peter's Keys), vulgo, Herba Paralysis,

Arthritica. Some also call them Primula veris, for they come early in the outgoing winter to announce to us the approaching spring. They must be gathered at that time, for they wither very quickly. Others call them Betonicum album—that is, White Betony—on account of the white colour of their leaves, which may be compared with the leaves of the Betony, or from the flowers, which are white or pale yellow. Again, some place them among the Verbascula—that is, the Mullein family. This question we will leave on one side and come to the description.

"There are two kinds of Cowslips. One grows in dry meadows and in grassy gardens; it grows close to the ground, spread out, with white crumpled leaves. Between them a round, smooth stalk pushes up, a span high, and the colour of ashes. At the summit of each stalk hang yellow flowers; they creep out of little empty sacks, like little cymbals, or the pipe of a key, about eleven of them more or less on one stalk. As the flowers fall, little heads come up filled with small seeds. The root is white and tough. The other Cowslip is usually found on mountains and in woods. It is similar to the first named, with the exception that the leaves are broader. The flowers are very pale yellow, and appear almost white.

"Both Cowslips have no special smell."

In a later work, "Matthioli Sinensis Medici," published in Venice in 1570, Matthiolus says:

"Verbascum, Ch. XCIX.—Brachœ cuculi Primula veris Sancti Petri. Herbæ Paralysis belong to the family of Dioscoris Phlomis because they have hairy round leaves and grow very low. But I do not agree with this.

"Their leaves are not hairy, nor are they round, but some would call them smaller curly as lettuces. Herbe paralysis golden flowers in spring."

Two woodcuts are given, these being named " Primula veris " and " Primula veris altera."

The name of Cowslip was well established in England, and specially connected with this particular flower in the time of Shakespeare, as we find from his writings. The earliest appears in " A Midsummer Night's Dream," where he speaks of the flowers in the immortal words, " The Cowslip tall her pensioners be," in which he compares the plant to the Pensioners of Queen Elizabeth, who were magnificently attired, and who were frequently mentioned in the literature of the time. As the play was supposed to have been written about 1592–94, this helps us to fix the time at which we can be certain that the name of Cowslip was really widely accepted, a date confirmed by the references in Ben Jonson. It is probable that the name is really Anglo-Saxon, and it is supposed by some to have been derived from the word *Cu-slyppe*. Skeat considers that this may have been derived from the plant being supposed to have sprung up where a patch of cow-dung had fallen. Prior tells us that it had nothing to do with either cows or lips, but Ben Jonson, in a playful way, speaks of " Bright Days-eyes and the lips of Cowes."

Other old spellings were Cuslyppa and Cusloppe, both Anglo-Saxon, and the Rev. Hilderic Friend informs us that in Devonshire the Foxglove was also named Cowslip, so that he considers it may have had something to do with the word " flip," and may not have referred to " lip " at all. A North Country name, which is evidently allied to the idea of the throat or lip, is that of " Coos-tropple, a cow tie, also a Cowslip; that is, cow's-thropple or throat, looking deeper than the lip " (Brockett). Halliwell, in his " Dictionary," gives the information that " a Cowstropple (Cowslip) in the month of January,

1632, was considered sufficiently curious to be presented as a New Year's gift."

Petty Mullein is another old popular term for the Cowslip.

The old name of Palsy Wort, which has its French counterpart in "Herbe a Paralysie," is in a different category.

Dr. Prior considers the name of Cowslip came to our Primula through a mistake for the Mullein, and refers it to the Flemish Kouss-hose and Lopp-flap, but the whole question is obscure.

The name of Paigle, occasionally applied to the Cowslip, is still more difficult to trace, and philologists are hopelessly at sea respecting its origin.

A suggestion has been made that it may have been derived from an old Scottish verb, "paigled," which means to be drooping with fatigue, and is said to have come from an Icelandic word, *piackur*, drooping.

It may be added, on the authority of Britten and Brown's "Illustrated Flora of the Northern United States and Canada," that the following plants are locally called "Cowslips" in some parts where they grow: Caltha palustris (also named "Spring," "American Cowslip"); Maianthemum bifolium; Ranunculus fascicularis; Impatiens biflora or fulva. Dodecatheon there, as here, is "American Cowslip"; and the "Virginian Cowslip" is Mertensia virginica. The Cowslip of Jerusalem is Pulmonaria officinalis, a plant long cultivated in the British Isles.

It was also called Herb Peter, from the old herbalists. The flowers are said to bear some resemblance to a bunch of keys, the emblem of the saint. Like the Primrose, it is understood to bear in Germany the title of Lady's Key, or Key Bloom. The authoress of "Stray Leaves

from a Border Garden" tells us that "a nice old name for the Cowslip is Our Lady's Keys"; that it is called "Lady's Fingers" in Fife; and "Fairy Caps, I believe, in Lincolnshire." The same writer also supplies us with the term of "Cow's Mouth" for our flower, together with the old one of Palsy Wort, Fairy Caps, and St. Peter's Wort. She gives the pretty legend from the German, which is said to be why some call the Cowslip there "Himmelschlüsselchen." It is to the effect that "one day, when Saint Peter was told that people were trying to get into heaven by a back way, so as not to enter by the great gate he was in charge of, he was so distressed that he dropped his keys. They fell on the earth, and where the bunch fell a posy of Cowslips appeared." Is not the authoress of the "Stray Leaves from a Border Garden" mistaken in calling the flower "Fairy Cap," as it is said to be called "Fairy Cup" in some parts of Kent? Another title given to the Cowslip was Drelip. The old name of Palsy Wort or Paralysis was applied to the flower from its fancied virtues in the healing of palsy, paralysis, and other diseases.

Its medicinal properties are not now appreciated, but the root is astringent and diuretic, and was at one time used medicinally. The Cowslip was formerly considered "good for pains in the joints and sinews." Culpepper says that the Greeks used the flowers for strengthening the brain and nerves. A balsam made from Cowslips was made, and this is said, according to the authoress of "Stray Leaves from a Border Garden," to be "sovereigne for green wounds," the herbalist she quotes also stating that "'tis a medicament which every good Country Man should keep in his house." It appears to have been used for what is called "Cowslip Oile."

From an old MS. volume of apothecaries' lore and household recipes we quote the following:

" For the Syming In Ye Head, Given by Mr. Vessalius (Ye Emperor Charles Phisition) To Quene Mary.

" Take two ounces of the budds of red Roses, or one ounce of very good oile of Roses, one ounce of Kowslip oile, and two spoonsfuls of woman's milk of a manchild, and three nutmegs finely beaten and serced, and as much mace made in powder as the nutmegs is, and a little red Rose water, and as much wine vinegar; mingle all these together, and warme it upon a chafing dish, and anointe the nape of the neck and the temples, and the crowne of the head, and under ye ears; you must rub it very well in, and keepe the head whett while it is dojng and after."

The odour of the Cowslip was said " to calm the heart."

Cowslip wine was said to induce sleep, a belief which Pope alludes to in the lines:

" . . . For want of rest
Lettuce and Cowslip wine—*probatum est.*"

Here is an old recipe for Cowslip Wine from the " Dictionarium Rusticum, Urbanicum and Botanicum," 2nd edition, published in 1717: " Cowslip Wine; to make this sort of wine, to every gallon of water put two pounds of sugar, boil it an hour, and set it to cool; that done, spread a good brown toast on both sides with yeast; but before you make use of it, beat syrup of citron therewith, an ounce and a half of syrup to each gallon of liquor. Then put in the toast while hot, to promote its working, which will cease in two days, during which time cast in the Cowslip flowers, a little bruised, but not much stamped, to the quantity of half a bushel to two gallons (or rather two pecks), and four lemons sliced with the rinds. Lastly, add one bottle of white or Rhenish wine,

and after two days tun it up in a sweet cask. Some leave out all the syrup."

The following is a more modern but well-proved recipe for an excellent Cowslip Wine:

"Three quarts of pips (flowers) go to one gallon of water; and two lemons and three pounds of lump sugar to one gallon. Boil the sugar and water for twenty minutes, and when it is nearly cold put in the pips, if freshly gathered; if not, pour the sugar and water hot over them. When just tepid, put in a little barm (yeast) on a wooden spoon or anything that will float. Then peel the rind off the lemons very thin, throwing away all the white when peeled; squeeze the lemons well and put them with the peel and pips into the wine when it is cold. Stir frequently for two or three days, and then cork it and bung it up air-tight. The wine should be bottled off in six or seven weeks."

Cowslip Mead.—Put thirty pounds of honey into fifteen gallons of water, and boil till one gallon is wasted; skim it, take it off the fire, and have ready a dozen and a half of lemons quartered; pour a gallon of the liquor boiling hot upon them; put the remainder of the liquor into a tub with seven pecks of Cowslip pips; let them remain there all night, and then put the liquor and the lemons to eight spoonfuls of new yeast and a handful of Sweet Briar; stir all well together, and let it work three or four days. Strain it, and put into the cask; let it stand six months, and then bottle it for keeping.—*From "A New System of Domestic Cookery," by a Lady, London,* 1846.

Cowslip Vinegar.—The following recipe is given more because of its interest to those who take pleasure in the lore of the plant than for any practical value. The

vinegar was to be used in making pickles, and the recipe appeared in *The Cottage Gardener* for April, 1849.

" To four gallons of water, with the chill just taken off, add six pounds of brown sugar and half a peck of Cowslips, flowers and stalks together; put all into a cask with three tablespoonsful of yeast; lay a piece of glass or slate over the bung-hole, and set it in a warm place till the vinegar turns sour, when the bung may be fastened down. A quarter of an ounce of gelatine or isinglass will make it clear sooner. Kept in a warm place, the vinegar will be ready in six months."

The Cowslip was also made into a conserve. What is said to have been a favourite dish long ago was a Cowslip tart, but no record appears to be in existence regarding the ingredients of this delicacy.

The leaves were at one time used as a salad; and it is said that silk-worms will feed upon the foliage also, but that their silk is of no value unless they are also supplied with Mulberry leaves.

An ointment made with the flower of the Cowslip was employed by the old herbalists. One of them tells us that " it taketh away the spots and wrinkles of the skin, and adds beauty exceedingly." This arose from the doctrine of signatures, the spots on the flower showing the efficacy of the plant for the removal of spots and blemishes

The spots of the flower were also said to show that the plant had the virtue of retaining the beauty of those who used it, and even of restoring the youthful beauty which had been lost.

The connection of the flower with legendary lore has been shown by the legend connecting it with St. Peter, but, as a favourite flower of the fairies, as denoted by the name of Fairy Cup or Fairy Cap, it has received much

consideration. The Cowslip was believed to shelter fairies in its cups.

The following quotation from Yarrell's "British Birds,' 4th edition, is of interest: "Walcott, in his 'Synopsis of British Birds' (vol. ii., 228), says that the nightingale has been observed to be met with only where the Cowslip grows kindly, and the assertion receives a partial approval from Montagu; but whether the statement be true or false, its converse certainly cannot be maintained, for Mr. Watson gives the Cowslip as found throughout Great Britain as far north as Caithness and Shetland, where we know that the nightingale does not occur."

It is recorded that the Cowslip was employed in an interesting processional ceremony which took place at Horncastle, Lincolnshire, and which existed until the beginning of the nineteenth century. On May-Day morning a number of youths collected at what was known as the May-Bank. Thence they walked in procession to the may-pole, carrying wands wreathed with Cowslips. Here, with loud acclamations, they struck their wands together and scattered the Cowslips to show their delight at the coming of spring and summer.

A favourite pastime in many parts of the country was for children to make up Cowslip balls and to use them in games, especially one called tisty-tosty—the ball sometimes bearing that name. The manner of forming the Cowslip ball is as follows: "The umbels or heads are picked off as close as possible to the top of the main stalks. From fifty to sixty of these are hung across a string stretched between the backs of two chairs. The flowers are then pressed carefully together, and the string tied tightly, so as to collect them into a ball. Care should be taken to have all the flowers open, so as to make the surface of the ball even."

CHAPTER IV

HYBRIDS OF VERNALES

Bibliography and Synonymy—Botanical description.

Hybrid Primulas of Section Vernales.

The bibliography and synonymy of these plants has been much abbreviated, and is only given so far as will elucidate the synonymy. The plants in most cases, however, are hardly worth considering from a garden point of view, and are much intermingled. Many resemble each other so closely that it is difficult to assert that they are distinct.

Primula elatior × officinalis, Muret. — *Primula elatior* × *officinalis*, Muret, in Reuter, Catal. Pl. Genève (1861), 143; also of Pax, in Engler's Bot. Jahrb., X., and of Widmer, cited elsewhere, is half-way between both its parents. It differs from *P. elatior* in its inflated calyx and its shorter habit, and in its pale, not bright yellow flowers, and its large flowers with flatter corolla limb.

1. *P. media*, Petermann, and of Kerner, is *P. unicolor* of Nolte and of Lange; *P. elatior v. decipiens*, Sonder; *P. lateriflora* of Goupil; *P. Tommasinii* of Lange; *P. elatior* × *officinalis* of Beyer; *P. glabrescens* of Arv.-Touvet; *P. leudrensis* of Porta.

This is a hybrid form from several parts of Europe, such as Holstein, through Germany to Bohemia and Savoy. It is said to be a hybrid between *P. elatior* var.

genuina and *P. officinalis* var. *genuina*. The flowers are yellow.

2. *P. sordida* of G. Beck, in Fl. Hernst. Kl. Ausg., 408. It is a hybrid between *P. elatior genuina f. colorata* and *P. officinalis genuina f. typica*, or between *P. elatior v. genuina f. typica* and *P. officinalis v. genuina f. hortensis*. In cultivation and growing freely in a wild state; flowers dull purple.

3. *P. Göppertiana*, Pax, and also of Stein, is a hybrid between *P. elatior genuina* and *P. officinalis macrocalyx*. The calyx is rather campanulate in form. Once cultivated in Breslau Botanic Garden.

4. *P. fallax*, C. Richter. This is a hybrid reputed to be between *P. elatior genuina* and *P. officinalis canescens*. It has the underside of the leaves thinly covered with a canescent tomentum. Of little merit as a garden plant. A native of North Austria.

5. *P. brevifrons*, Borbas, is, according to Borbas, a hybrid between *P. elatior* and *P. officinalis Columnæ*. From Switzerland and Hungary. Has the leaves canescent-tomentose below.

6. *P. sileniflora*, H. Schmidt, has the corolla divided to the base. A native of Silesia.

Primula acaulis × elatior Muret.—*P. acaulis* × *elatior*, Muret, in Cat. Pl. Genève (1861), 144. Also of Ljungstrom; Beyer; Pax, in Engler's Jahrb., and Widmer; and *P. elatior* × *vulgaris* in Grenier, Fl. Chain Jurass. (1865–75), 500. This is intermediate between the parents, or differs from *P. acaulis* in having a visible scape, with the flowers often smaller, and mainly from *P. officinalis* in having the calyx nearly glabrous, in being shorter in stature, and in having paler flowers.

1. *P. digenea* of Kerner is *P. fallax* of C. Richter, exsicc. *ex parte* (this reference is doubtful), and is *P. Falkneriana* of Porta *ex parte*? Intermediate between the parents with regard to characteristics. Scape obvious; flowers solitary, none from the base; pedicels much longer than the calyx. Corolla limb from 20 to 26 mm. in diameter. A native of Great Britain, Belgium, France, Switzerland, Bavaria, Austria, etc.

2. *P. anisiaca*, Stapf., and also of Beck. This hybrid comes nearer to *P. acaulis* than to *P. elatior*. It has a short scape, with many flowers, and the pedicels are much longer than the calyx. Corolla about 20 to 26 mm. across. Belgium, Holstein, Switzerland, and Lower Austria.

3. *P. caulescens* (Koch), Pax. This is *P. acaulis* var. *caulescens* of Koch, Neilreich, and of Pax, in Engler's Bot. Jahrb.; *P. pseudoacaulis* of Schur. It is a secondary hybrid, and comes closely to *P. acaulis* in its foliage and flowers, but the scape is elongate, the leaves longer. The corolla is from 20 to 30 mm. in diameter. It has no solitary basal flowers. Pedicels elongated. From Germany, Austria, and Switzerland.

4. *P. Falkneriana*, Porta, exsicc., 1882. A secondary hybrid, approaching *P. elatior*. Scape apparent, longer than the leaves. No solitary flowers from the base. Pedicels either equal to or longer than the calyx. The flowers are often nodding, and the limb of the corolla is about 18 to 22 mm. in diameter. Germany, France, Austria, etc.

5. *P. purpurascens* (Camus), Beck, in Fl. Niederoesterr. (1893), is *P. acaulis* var. *purpurascens* of Camus; *P. purpurascens* of Pospichal. It is a hybrid between *P. acaulis* and *P. elatior genuina hortensis*. The flowers are a dull

purple, about 20 mm. across. The scape is short, often with solitary basal flowers, often borne with long pedicels.

Note.—The first four of the above hybrids are hybrids of *P. acaulis genuina* and *P. elatior*, or var. *genuina*, or var. *carpathicum*, or var. *intricatum*.

P. ACAULIS × OFFICINALIS, LJUNGSTROM.—*P. acaulis* × *officinalis*, Ljungstrom, in Bot. Centralbl., XXXV. (1888), 182; Beyer; Pax, in Engler's Bot. Jahrb., and Widmer.—*P. officinalis* × *vulgaris*, Grenier.—*P. pseudoacaulis*, Caruel.—*P. officinalis* var. *subacaulis*, Döll.

This hybrid is intermediate between the parents. It differs from *P. acaulis* in having a scape, and in its smaller flowers. From *P. officinalis* it varies through having the scape with longer hairs, often shorter than that of the parent, the non-nodding flowers having longer pedicels, generally borne on a scape, but frequently produced at the base and solitary. It also differs from *P. acaulis* × *elatior* in having a shorter pubescent calyx and in the capsules being shorter. It has a lower scape and larger flowers than the hybrid *P. elatior* × *officinalis*.

Hybrids between *P. officinalis genuina* and *P. acaulis genuina*.

1. *P. Sanctæ Coronæ*, Beck. With basal flower scape. Flowers solitary. Calyx toothed. The teeth of the calyx equal to half the length of the tube.

2. *P. radiciflora*, Lange and Mortensen.—*P. variiflora*, Beck. This hybrid has solitary flowers at the base, and few-flowered umbels. The teeth of the calyx are only about one-third the length of the tube, or of the same length. From Sweden, Germany, France, and Austro-Hungary.

3. *P. flagellicaulis*, Kerner, and also of Beck. Without basal solitary flowers, and with the scape about equal

in length to the leaves and small-flowered. The pedicels are equal to or longer than the scape. From Bornholm.

4. *P. brevistyla,* D C.; Reichb.; and Kerner.—*P. variabilis,* Goupil.—*P. variabilis crenulata* and *P. variabilis expallens,* Lange.—*P. intermedia,* Facchini. Without solitary flowers at the base, and having umbels bearing a number of flowers on scapes as long as or longer than the leaves. The pedicels are equal to or longer than half the length of the scape. Recorded from England, Sweden, Schleswig-Holstein, France, Austria, etc.

5. *P. Legueana,* Camus, also of Beck, is a small form close to *P. officinalis,* with deep yellow flowers, which are only a little larger, according to different examples. Furnished with a very flat corolla limb. From Denmark and France.

Hybrid between *P. officinalis macrocalyx* and *P. acaulis genuina.*

6. *P. cupularis,* Pax.—*P. acaulis* × *macrocalyx,* Pax, in Engler's Bot. Jahrb. Calyx of an inflated funnel shape. From Silesia.

Hybrids between *P. officinalis canescens* and *P. acaulis genuina.*

7. *P. Wiesbaurii,* Pax. Leaves with ashy-coloured pubescence on under-surface. Flowers solitary, produced from the base, and on shortened few-flowered scapes. Pedicels elongate. From Austria.

8. *P. Richteri,* Pax. Leaves with ash-coloured pubescence underneath. Scape short, hardly longer than the leaves, few-flowered, and with no flowers at the base. The pedicels are elongate, about half the length of the scape or longer. From North Austria.

9. *P. austriaca,* Wettstein, in Kerner. Leaves coloured

underneath with a greyish-purple. Scape longer than the leaves, without solitary flowers at the base, and having elongate pedicels two or three times less than the scape in length. From France and Austria.

10. *P. gaisbergensis,* Pax. Leaves with ash-coloured pubescence on the under-surface. Without basal flowers, and the scape exceeding the leaves in length. The flowers are semi-nodding and are small. The pedicels are much shorter than the scape. Austria.

Hybrids between *P. officinalis Columnæ* and *P. acaulis genuina.*

11. *P. tomentosa,* Beck.—*P. acaulis* × *tomentosa,* Beck, in Ann. Hofmus Wien., II., etc. Leaves on short, contracted petioles, and with white tomentum underneath. Without a scape. A secondary hybrid, coming nearest to *P. acaulis.* From Bosnia.

12. *P. Brandisii,* Wiesbaur, and also Beck. The leaves of this hybrid are covered with an ash-coloured tomentum underneath; it possesses a very short scape of yellow flowers smaller than those of *P. acaulis.* It has no basal flowers. From Bosnia.

13. *P. ambigua,* Beck. This Bosnian hybrid produces leaves covered beneath with dense ash-coloured tomentum. The scape has solitary flowers at the base. From Bosnia (and also Switzerland !).

14. *P. ternoviana,* Kerner. This is *P. travnicensis* of Wiesbaur; *P. bosniaca* of Beck, and also of Fiala; and *P. variabilis* of Caruel. The leaves are canescent-tomentose on the under-surface. The scape is as long as or longer than the leaves. It is without a solitary basal flower. From Switzerland, Italy, France, and Bosnia.

15. *P. Tommasinii,* Godron and Grenier, also of

Reichb.; Willkomm and Lange; Caruel and Beck.—*P. officinalis* subsp. *Columnæ* var. *Tommasinii*, Widmer. —*P. macedonica*, Adamovic. A hybrid which comes very close to *P. officinalis Columnæ*, differing from it in having citron-yellow flowers, with the throat marked with five orange-coloured spots. Limb nearly flat. A native of the Pyrenees, Bulgaria, Armenia, etc.

Hybrids between *P. acaulis rubra* and *P. officinalis genuina*.

16. *P. anglica*, Pax. A hybrid having flower scapes which are equal in length to, or rather longer than, the leaves. The pedicels are elongate. Flowers purple or red. A garden variety or growing wild. It is intermediate between the parents. Perhaps the most abundant garden Primula in cultivation.

17. *P. tristis*, Pax. A hybrid plant which approaches more nearly to *P. officinalis*, but with smaller flowers of a dull purple. Pedicels shorter than in the foregoing. A garden form, often reproducing itself.

CHAPTER V

SECTION FARINOSÆ, PAX

Bibliography and Synonymy—Key to Species: P. algida, Adams; P. sibirica, Jacq.; P. sibirica var. arctica, Pax; P. sibirica var. integrifolia, Pax; P. frondosa, Janka; P. farinosa, L.; P. farinosa var. scotica, W. J. Hook; P. stricta, Hornem.; P. longiflora, All.; P. Fortunei.

Key to the European Species.

Leaves finely toothed. Farinose or without farina.
Flowers almost sessile.
Corolla tube equal to or only a very little more than the calyx. *P. algida.*
Flowers distinctly pedicellate.
Leaves distinctly petiolate, sharply narrowed into a petiole.
Leaves entire or denticulate.
Involucral bracts lengthened towards the base.
Flowers violet or rose, small. *P. sibirica.*
Leaves denticulate. Farinose.
Flowers with long pedicels.
Bracts of involucre hardly swollen at base.
Capsule as long as or longer than the calyx. *P. frondosa.*
Leaves narrowing gradually into a short, indistinctly winged petiole.
Bracts at base slightly gibbous.

PRIMULA ALGIDA, ADAMS.

PRIMULA VISCOSA, ALL.

See page 93.

PRIMULA SIBIRICA, JACQ.

Corolla tube equal to the calyx or slightly longer.
Scape longer than the leaves.
Sepals triangular, subobtuse.
Farinose or rarely without farina. Lobes of corolla obcordate-bifid. *P. farinosa.*
Without farina, corolla lobes shortly emarginate. *P. stricta.*
Corolla tube very long. *P. longiflora.*

Primula algida.

Primula algida is more an Asiatic than a European Primula, being a native of extreme Eastern Europe. It is a species very nearly akin to P. farinosa, from which it differs by its large, spathulate, obtuse, finely-toothed leaves, and by its large corolla of intense violet colour, and, above all, by its globular capsule, which is longer than the calyx.

Primula sibirica, Jacq.

Bibliography and Synonymy.—*P. sibirica*, Jacq., Misc. Austr., I. (1778), 161; Duby, in D C. Prodr., VIII. (1844), 43; Ledeb., Fl. Ross., III. (1847–49), 14; Herder, in Acta horti. petropol., I. (1872), 395; Regel, in Acta horti. petropol., III. (1874), 150; Hook, f. Fl. Brit. Ind., III. (1882), 487; Pax, in Engler's Bot. Jahrb., X. (1889), 197; Widmer, Europ. Art. Primul. (1891), 119; Derganc, in Acta horti. petropol., XXI. (1903), 372.

It is without farina, and the typical species has leaves from 1·5 to 2 cm. in length and from 1 to 1·5 cm. broad, or a little less. They are pale green, glabrous, membraneous, elliptic-orbicular or ovate, obtuse, entire or with small teeth, and on long petioles about 2 cm. in length with the limbs sharply attenuate. The slender

scape is longer than the leaves, and is about 6 to 18 cm. in height, and bears a few flowers in a loose umbel. The bracts are oblong and obtuse, from 6 to 8 mm. in length, with a saccate base. The pedicels are shorter, and are from 1 to 2·5 cm. in length, slender. The tubular calyx is about 6 to 8 mm. in length, with five-ribbed, short, rather obtuse lobes. The corolla is lilac or rose, with the tube exceeding the calyx; the throat is unringed; the limb from 0·8 to 1·5 mm. in diameter, often less; the lobes obcordate, deeply margined. Capsule cylindrical, protruding from the calyx.

Var. *b, integrifolia* (Oeder), Pax.—*P. integrifolia,* Oeder, in Fl. Danica (1767), t. 188.—*P. rotundifolia,* Pallas, Reise, Prov. Russ. Reiches, III. (1776), 223.—*P. finnmarchica,* Jacq., Misc. Austr., I. (1778), 160.—*P. norvegica,* Retz., Fl. Scandin. Prodr., ed. 2 (1795), 55; Hornemann, in Fl. Danica (1828), t. 1809.—*P. nutans,* Georgi, Beschr., Russ. Reichs., I. (1797), 200.—*P. sibirica* var. *genuina,* Trautvett, Plant. imag. Fl. Ross. (1844–46), 44, t. 30, f. a–f. —*P. sibirica* var. *minor,* Duby, in D C. Prodr., VIII. (1844), 43 *ex parte.*—*P. sibirica* var. *parviflora,* Regel., in Acta horti. petropol., III. (1874), 151 *ex parte.*—*P. sibirica* var. *kashmiriana,* Hooker, f. in Curtis, Bot. Mag. (1880), t. 6493.—*P. sibirica* var. *rotundifolia* and var. *finnmarchica,* Pax, in Engler's Bot. Jahrb., XIX. (1889), 197.—*P. sibirica* var. *mistassinica,* F. Kurtz, in Engler's Bot. Jahrb., XIX. (1895), 396.—*P. intrusa,* Reichb., Iconogr. Bot., VII. (1829), 15, t. 631 ?

Calyx from 6 to 8 mm. in length. Corolla tube little or only equalling the calyx. Flowers larger or smaller than the type.

Var. *e, arctica,* Pax.—*P. intermedia,* Ledeb., in Mém. Acad. St. Pétersb., V. (1815), 519 ?—*P. sibirica* var.

parviflora, Regel, in Acta horti. petropol., III. (1874), 151 *ex parte.*—*P. sibirica* var. *brevicalyx*, Korshinsky, in Mém. Acad. St. Pétersb., 8 Ser., VII. (1898), 284.

Calyx about 4 mm. in length; corolla tube almost twice as long as the calyx. Flowers small.

Primula sibirica and its varieties are wrapped in a certain amount of mystery and uncertainty, there being considerable confusion as to what are really the true plants. It is claimed that both P. sibirica var. integrifolia and var. arctica are found in Norway, Sweden, and Finland, but it is difficult to understand why, if this is the case, we have not succeeded in getting the true plants into cultivation in Britain; but certainly the plants masquerading in British gardens under the name of P. sibirica are not the real thing, as plainly shown by comparison with the dried specimens of the two varieties named which are in the herbarium at the Royal Botanic Gardens, Edinburgh.

The St. Petersburg collection contains specimens of the microform forms of P. sibirica, and when the opportunity presents itself for examining these and comparing with the Edinburgh forms, more light will be thrown upon the plants upon which even Pax was not very lucid.

Primula frondosa, Janka.

Bibliography and Synonymy.—*P. frondosa*, Janka, in Oesterr. Bot. Zeitschr., XXIII. (1873), 204; Boiss., Fl. Orint., IV. (1879), 30; Pax, in Engler's Bot. Jahrb., X. (1889), 201; Widmer, Europ. Art. Primul. (1891), 123; Velenvosky, Fl. Bulgar. (1891), 477.—*P. farinosa*, Griseb., Spicileg. Fl. Rumel., II. (1844), 2.—*P. farinosa* var. *turcica*, Frivaldsky, exsicc.; *P. algida*, Janka, exsicc.?

Farinose, smooth. Leaves slender and rather mem-

braneous, about 2·5 cm. in length and about 1·5 cm. broad, cuneate-oblong or obovate, obtuse, with the petiole limb equal or moderately attenuated, sharply-toothed, or, when old, repand-crenulate and slightly undulated. Scape longer than the leaves, and from 4 to 10 cm. in height, bearing a number of flowers in a loose umbel, with small, linear, lanceolate bracts, which are not saccate at the base. The slender flexile pedicels are about 2·5 cm. long. Calyx almost 4 mm. long, tubular, bell-shaped, with pointed triangular lobes. Corolla of a pleasing blue or purple, with the tube little longer than the calyx. Limb about 1·5 cm. across, with obcordate lobes, bifid at the margin. Capsule cylindrical, equalling the calyx, or one and a half times longer.

The plant known in gardens is asserted to be different from that originally described by Janka, which is said to be very rare. I have examined one of Janka's type plants, and think the species is founded on very mature plants which have lost their mealiness. If the plant known in gardens as *P. frondosa* is cultivated in shade and fully developed, it agrees in every particular with Janka's specimen, and I cannot see, for my part, that there is any real distinction between them.

P. frondosa is a native of the Balkans in North Thrace, and grows among the damp rocks beside the springs fed by the snow water. It is, however, easy to cultivate in drier soil, as well as in the bog and other moist places in the garden. I have seen a large bed of this by the side of a stream, and the two or three thousand plants there, which had been raised from seeds, made a very delightful spectacle. It is also a nice pot plant. When cultivated in the border, if there is little moisture, it ought to be given partial shade, and should it be planted

PRIMULA FRONDOSA, JANKA.

PRIMULA FARINOSA, L.

(The Bird's-Eye Primrose.)

on rockwork in a place where it is dry or exposed to drought in summer, it should be placed in a slight hollow, well drained and sheltered from strong sun. It is a wonderfully accommodating plant.

The colour varies a little from seeds, but I have never met with a white variety. Some of the plants are considerably darker purple than others.

P. frondosa is easily raised from seeds.

It is not very fastidious regarding soil, but prefers a light, peaty one.

Primula farinosa, L.

Distribution.—Arctic, sub-Arctic, and mountain regions of Northern Temperate Zone (and Andes of South America from Chile to Tierra del Fuego).

Pax gives the British *P. farinosa* under the title of "Subsp. *eufarinosa*, Pax," and gives the following:

"Bibliography and Synonymy.

"*P. farinosa*, Schmidt, Fl. Boem., II. (1793), 44, t. 169; Lehmann, Monogr. Prim. (1817), 52; Koch, Synops. Fl. Germ., ed. 1 (1837), 586; Duby, in D C. Prodr., VIII. (1844), 44; Ledeb., Fl. Ross., III. (1847–49), 13; Godron et Gren., Fl. France, II. (1852), 450; Reichb., Icon. Fl. Germ., XVII. (1855), 36, t. 51, f. I.-II.; Willk. et Lange, Prodr. Fl. Hisp., II. (1870), 639; Hook, f. Fl. Brit. Ind., III. (1882), 486; Gray, Synop. Fl. North Amer., II., 1 (1886), 58; Simonkai, Enum. Fl. Transsylv. (1886), 158; Widmer, Europ. Art. Prim. (1891), 119; Bentham and Hook, Handb. Brit. Fl., 6 ed. (1896), 290; Bubani, Fl. Pyren., I. (1897), 221; Ascherson et Gräbner, Fl. Nordostdeutsch. Flachl. (1889).—

P. farinosa var. *vulgaris* et var. *scotica*, A, D. C. Georg. bot., II. (1855), 1049.—*Aleuritia farinosa*, Opiz, in Berchtold, Oek. techn. Fl. Böhm., II. (1838–39).

Reliable illustrations of this species will be found in Loddige's "Botanical Cabinet," t. 1649, and in Syme's (now Boswell) "English Botany," ed. 3, t. 1134. It is also figured in Wooster's "Alpine Plants," 1st Series, Plate LIII., and in Maund's "Botanic Garden," besides several other works.

Parkinson gives a figure in "Paradisus," with the name of "Paralysis minor angustifolia rubra, Red Bird's Eyes." He also describes the white variety.

P. farinosa, the Bird's Eye Primrose, is one of our most beautiful native plants. It is very plentiful in some parts of Northern England, especially in the Lake Districts and Carnarvon, and is also met with in certain parts of the South of Scotland, though not plentiful there. It is widely distributed on the continent of Europe.

Description.—The plant is from 4 to 30 cm. in height. The leaves are from 1 to 8 cm. long, 0·5 to 2 cm. broad, ovate, spathulate, crenulate, obtuse or subacute, glabrous above and farinose below. It produces a stout scape, rising above the leaves, carrying in compact umbels a number of dimorphic flowers, light purple in the type, but which vary from pink lilac to white, and have a yellow eye. In the variety *acaulis* the plant is practically stemless. The bracts are small, saccate at the base. The pedicels are generally shorter than the calyx, which is 4 to 6 mm. long. The limb is 10 to 16 mm. across, with obcordate lobes. The capsules are about equal to or longer than the calyx.

P. scotica is now recognised as only a subspecies or variety of *P. farinosa*, differing mainly in size—it is smaller in all its parts; the calyx is shorter; the bracts are less saccate, and the leaves are broader in proportion to those of the typical *P. farinosa*.

The other European subspecies recorded is *P. davurica*, Sprenger, from Russia and Bulgaria, which differs little from the type, but has been divided by botanists into several varieties of little consequence to horticulturists. These are *davurica* var. *exigua*=*P. exigua*, Velenowsky, and *davurica* var. *intermedia*=*P. exaltata*, Lehm., and *P. altaica* of Lehm., with var. *Hornemanniana*, from the Pyrenees and Alps.

P. farinosa is a delightful plant frequently found, as I have already said, in the North of England, and for a long period in summer it presents one of the most beautiful effects possible among the grass and in the bogs. Acres are stained with its purple colouring, and a visit to the Lake District at the time it is in bloom will well reward the Primula lover for the journey, not only because of the exquisite effect of the flowers in a mass, but also from their appearance as they raise their umbels of bright little flowers above the surrounding grass. Such a visit will also afford useful hints respecting the cultivation of the plant, which some find rather difficult, although the writer succeeds well with it in the open ground in ordinary soil. It is found in many different soils and positions in its native habitats, where it varies much in stature, owing to these varying conditions. One of the prettiest sights presented by this Primula which I have seen was on a steep, moist hill-side, sloping to a lake, where, amid the grass, *P. farinosa* in patches and in single plants produced an exquisite effect. In its native home

it is most amenable to various conditions, owing probably to the fact that the plants are self-sown seedlings which have from the seedling stage accommodated themselves to their surroundings. I have observed many plants growing in a black peaty soil, quite dry in summer, but moist in winter, from the heavy rainfall. In summer these plants were dwarfed and almost shrivelled up, even at the flowering stage, but later in the year they became plump and healthy. Brilliant sunshine seems to suit it as long as it is moist at the roots. The colour, as already indicated, is variable, and the bright rose varieties sometimes shown in colour photographs are scarce indeed. The albino forms vary much in purity of tone, and the purest and best white varieties originated from plants found by Mrs. Saunders, of Wennington Hall, Lancashire, in the meadows of Wennington estate. These are very beautiful indeed, and are far superior to the ordinary albinos.

While no difficulty in cultivating the Bird's Eye Primrose in ordinary soil is experienced by some, many cultivators have undergone considerable trouble in attempting to grow it in their gardens. P. farinosa is naturally a native of the mountain marshes, and it frequently resents its transportation to drier and more cultivated soil. I have observed it flourishing in a compost of one part loam, one of peat, and about a fourth of sand and grit, and in a low-lying, sunny position, where it was assured of plenty of moisture during the growing and flowering season. I have also met with it thriving in a stiffish, rather heavy, sticky loam, which did not dry up readily in summer. Some have attempted it in turf, endeavouring to imitate the natural conditions under which they have seen it, but in a moist place such as

PRIMULA FARINOSA VAR. SCOTICA, W. J. HOOKER.

(Scottish Bird's-Eye Primrose.)

PRIMULA LONGIFLORA, ALL.

PRIMULA FORTUNEI.

it likes the grass grows too rank. Even turves from its native habitats, lifted with plants of P. farinosa growing in them and placed in the garden, produce too coarse grass. The semi-shade afforded by the grass does not appear to be necessary for the welfare of the plants, as in certain places where *P. farinosa* grows wild many of the plants are in spots almost bare of other vegetation and are fully exposed to the sun. Seeds of P. farinosa germinate readily and quickly, most of them appearing within a week or two after sowing, provided this is done as soon as ripe.

Primula farinosa var. scotica.

Primula scotica of Hooker is now recognised as a subspecies of *P. farinosa*, specific rank being denied to it by botanists. It is, from a horticultural standpoint, quite a distinct plant, however, and deserves some special consideration. The flowers are not dimorphic, as in the case of farinosa. They are in colour a fine, rich, violet purple, very rarely white, the charming appearance being accentuated by the yellow throat of the blooms. It is a choice little plant for the garden, but is, unfortunately, much more troublesome to cultivate than the typical *P. farinosa*. It is difficult to retain after flowering, as it has a bad habit of dying off immediately.

It is a native of sandy heaths, and is often found near the sea in Caithness, Sutherland, and the Orkney Islands, also in Lapland, Norway, and Sweden, so that it probably resents the moisture in our gardens, together with the absence of the sea-breezes which tend to keep it dry at the neck of the plant. Under the same conditions as those in which P. farinosa thrives it is less successful, and it requires a drier place, such as is afforded by a rockery,

and a top dressing of gritty sand about its crowns just when flowering is in progress. At least, these are the conditions under which the writer has managed *P. scotica* most successfully. Treated in the same way as *P. farinosa*, in a moist place, it damped off at the neck.

Seeds of P. scotica afford a ready means of securing this scarce plant, which is not now too plentiful in its native habitats, but they are slower of germination than those of P. farinosa, and will generally lie dormant until the spring after they have been sown. I have even known germination not to take place for two years. It is, however, an exquisite little plant, which should be cultivated if at all possible. P. scotica has three flowering seasons at intervals from June to September.

Primula stricta, Hornem.

Bibliography and Synonymy.—*P. stricta*, Hornemann, in Fl. Danica (1810), t. 1385; Duby, in D C. Prodr., VIII. (1844), 44; Ledeb., Fl. Ross., III. (1847–49), 13; Blytt., Norges. Fl. (1874), 825; Regel, in Acta Horti. petropol., III. (1874), 139; Warming, in Bihang till Svensk. Vet. Akad., XII., 3 (1889), 21, f. 7, e–i; Pax, in Engler's Bot. Jahrb., X. (1889), 198.—*P. farinosa* var. *stricta*, Wahlenberg., Fl. Lapponica (1812), 60; Widmer, Europ. Art. Primul. (1891), 122.—*P. Hornemanniana*, Lehm., Monogr. Primul. (1817), 55, t. 4 *ex parte*.—*P. glabrescens*, F. Nylander ex W. Nyl. and Saelan, Herb. Mus. Fenn. (1859), 32.—*P. stricta* var. *obesior*, Norman, Ind. Suppl. loc. nat. spec. (1864), 297.—*Androsace stricta*, Hartm. ex Duby, as above.

Description.—Except the calyx, this plant is without farina. Leaves 1·5 to 3 cm. long and 0·5 to 1·5 cm. broad, ovate-lanceolate or lanceolate, veined, entire or dentate,

acute or obtuse, gradually attenuated or more rarely contracted into a winged petiole the same length as, or shorter than, the lamina. Scape from 8 to 25 cm. in height, erect, and bearing an umbel of from three to five flowers, rarely eight. Bracts linear, awl-shaped, acuminate; pedicels shorter, concavely saccate at the base, 4 to 12 mm. in length, extending after flowering to about 30 mm. or more. Calyx 4 to 12 mm. in length, urceolate-campanulate; the interior and between the sinus of the teeth farinose. The lobes of the calyx are lanceolate. The corolla is violet, and the tube one or two times longer than the calyx. The limb is from 5 to 8 mm. in diameter, the lobes narrow and obcordate. Capsule rising above the calyx.

This species is really a small *P. farinosa*, but is distinguished by its very short flower stalk; by the underside of the leaves being without meal; by the almost rounded teeth of the corolla; and by the lobes of the flowers being very slightly indented. It is a native of sub-Arctic Europe, Norway, North Sweden, Lapland, and Northern Russia.

It is easily cultivated under the same conditions as *Primula farinosa*, but is not at all plentiful. I have no record of the date of its introduction into cultivation.

Primula longiflora, All.

Bibliography and Synonymy.—*P. longiflora*, All., Fl. Pedem., I. (1785), 92, t. 39, f. 3; Lehm., Monogr. Primul. (1817), 49; Koch, Synops. Fl. Germ., ed. 1 (1837), 586; Duby, in D C. Prodr., VIII. (1844), 45; Reichb., Icon. Fl. Germ., XVII. (1885), 36, t. 51, f. IV., V.; Regel, in Gartenfl., XXVII. (1878), 129, t. 937*a*; Simonkai, Enum. Fl. Transsylv. (1886), 458; Beck, in Ann. Hofmus. Wien., II. (1887), 145; Pax, in Engler's Bot. Jahrb., X. (1889),

201; Caruel, in Parl. Fl. Ital., VIII. (1889), 621; Velenovsky, Fl. Bulg. (1891), 477; Widmer, Europ. Art. Primul. (1891), 122; Kustnetzow, Fl. Cauc. crit., IV. (1901), 112.—*Aleuritia longiflora*, Opis, in Berchtold, Okon. techn. Fl. Bohm., II. (1838–39), 196.

Description.—Farinose. Leaves pale green, 2 to 7 cm. long, and from 0·5 to 3 cm. in breadth, rarely ovate, and generally oblong-obovate, acute or blunt, denticulate or almost entire on short, broad petioles, hardly noticeably narrowing from the lamina. Scape strong, and from 10 to 30 cm. in length as a rule, seldom less, bearing a many-flowered umbel. Bracts pointed from the broad base, often denticulate, subsaccate at the base. Pedicels from 4 to 12 mm. long, seldom longer. The calyx, 7 to 14 mm. long, is frequently coloured, is angular, with tubular lanceolated lobes, sharp or blunt. The corolla is violet, with a yellow throat, the tube being from 20 to 30 mm. long, greatly exceeding the calyx. The limb is 2 cm. in diameter. The capsule is cylindrical and exceeds the calyx. The stamens are always inserted in the throat of the corolla.

This handsome Primula is a native of South-Eastern Europe, and flourishes particularly in the Carpathians, the Balkans, and the Caucasus. It resembles P. farinosa, but is easily distinguished by the great length of the corolla, which is about three times the length of the calyx. It is well figured in Reichenbach's "Ic. Fl. Germanica," XVII., t. 1092, but the coloured plates in Maund's "Botanic Garden" and Wooster's "Alpine Plants" do not represent the colour properly.

P. longiflora is not difficult to cultivate under much the same conditions as *P. farinosa*, but can do with a little less moisture. It is quite hardy, and delights in

good loamy soil or in a moist moraine. Where moisture cannot well be given it may have additional shade, but will not flower so freely.

P. longiflora is understood to have been introduced in 1818.

FARINOSA × LONGIFLORA.—P. Kraettliana of Brügger, in Jahrb. naturf. Gesellsch. Graubündt, 25 (1882), 99.

DESCRIPTION.—Leaves 3 cm. long, 0·8 cm. wide. Two scapes arise out of a rosette of leaves, one being 11·5 cm. high with thirteen flowers, the other more graceful, growing to 8 cm. high and having six flowers. Corolla, same as P. farinosa.

It is very doubtful if this is a hybrid, or merely an abnormal form of P. longiflora; if the former, it is the only European hybrid of this section. It was collected by Kraetlli in 1876, and was mentioned by Brügger.

PRIMULA FORTUNEI.

A glance at the accompanying illustration will convey a sufficiently clear idea of P. Fortunei to convince the reader that the plant is thoroughly deserving of notice, and a most desirable little Primula possessed of several interesting features that should ensure for it a welcome in any collection. Of its origin or pedigree little is known with certainty. The generally accepted idea is that it is a hybrid of P. farinosa × P. denticulata, hence my reason for including it in this book. Personally I do not agree with those who consider it a hybrid, and am of opinion that it is a good species intermediate between P. farinosa and P. frondosa, and that it was sent home from China by Robert Fortune, a native of Berwickshire, who went out to that country on three different occasions between 1844 and 1858 to collect plants for the Horticultural

Society. A strong point has been made in support of its hybrid character in that seeds are very seldom produced. On the other hand, such evidence is not conclusive, for not only have seeds been produced and ripened, but the progeny have proved true in every detail to the parent plant, and this, to say the least, is quite exceptional in the case of hybrids. Although very scarce, it is by no means a new-comer, as it has been in cultivation for more than half a century, and was figured by Moore in the *Floral Magazine*, 1890–97, from a plant which was in the possession of Messrs. J. Henderson and Son. Until about twelve years ago, the only specimens known in cultivation belonged to the late Colonel Beddome, of Putney, who had grown the plant for several years, but did not state how he obtained his stock. In 1905 Colonel Beddome presented a plant to the Royal Gardens, Kew, and from this a stock has been raised by division. Let us now look at the plant and turn our thoughts to its merits. Its foliage is coarsely dentate, sparsely coated with white farina. The scape rises well above the leaves to a height of 3 inches or thereabouts. The flower-heads bear obvious resemblance to P. farinosa, the colour of the flowers being bluish-lilac of a lively tint, to which is added the attractiveness of a Primrose yellow eye sharply defined. The plant is not perfectly hardy, requiring frame culture or accommodation in the Alpine home, of which it is well worthy, since it flowers early in February and remains in bloom over a lengthened period. It should be grown in pots, the required compost being sandy, fibrous loam with a fair proportion of leaf mould. In summer the plants should be removed to a cool shady place and afforded liberal supplies of water. Stock may be increased without difficulty by division of the crowns immediately after flowering.

CHAPTER VI

SECTION AURICULA, PAX

Key to Subsections—Subsection 1: Euauricula, Pax (P. Auricula, Linn.; P. Palinuri, Petagna)—Subsection 2: Brevibracteatæ, Widmer (P. marginata, Curtis; P. carniolica, Jacq.; P. viscosa, All.)—Subsection 3: Arthritica, Schott (P. spectabilis, Tratt. P. glaucescens, Moretti; P. Wulfeniana, Schott; P. Clusiana, Tausch.)—Subsection 4: Erythrodrosum, Schott (P. pedemontana, Thomas; P. apennina, Widmer; P. œnensis, Thomas; P. villosa, Jacq.; P. cottia, Widmer; P. hirsuta, All.)—Subsection 5: Rhopsidium, Schott (P. Kitaibeliana, Schott; P. integrifolia, L.; P. tyrolensis, Schott; P. Allionii, Loiseleur)—Subsection 6: Cyanopsis, Schott (P. glutinosa, Wulfen.; P. deorum, Velenovsky)—Subsection 7: Chamæcallis, Schott (P. minima, Linn.).

Section Auricula, Pax.

Bibliography and Synonymy.—*Auricula*, Pax, in Engler's Bot. Jahrb., X. (1889), 219.—Sect. *Auricula*, Duby, in D C. Prodr., VII. (1844), 37.—Sect. *Arthritica*, Duby, Bot. Gall., I. (1828), 38 *ex parte*.—Sect. *Auriculastrum*, Widmer, Europ. Art. Prim. (1891), 137.—*Aretia*, Link, Handb. II. (1829), 411.

Key to the Subsection.

A. Leaves fleshy, entire or dentate. Bracts short and broad. Calyx short. Flowers yellow.
Subsection *Euauricula*.

B. Leaves fleshy, dentate, or almost entire. Bracts short, broad. Calyx short. Flowers violet or rose. Subsection *Brevibracteatæ.*

C. Leaves coriaceous, smooth, entire, with cartilaginous margin. Bracts long, narrow. Calyx long. Flowers rose. Subsection *Arthritica.*

D. Leaves fleshy, dentate, emarginate, with glandular hairs, without farina. Glands exuding reddish viscum. Bracts short. Flowers rose or purple. Subsection *Erythrodrosum.*

E. Leaves fleshy, toothed, with glandular hairs, without farina, the glands without coloured viscidity. Bracts long. Flowers rose or purple. Subsection *Rhopsidium.*

F. Leaves fleshy, smooth, without pubescence, crenate-serrate, viscid. Bracts broad and leafy. Flowers violet blue. Subsection *Cyanopsis.*

G. Leaves coriaceous, smooth, cuneate, with the apex truncate, serrated. Bracts elongated. Flowers rose. Subsection *Chamœcallis.*

SUBSECTION 1: EUAURICULA, PAX.

Bibliography.—*Euauricula,* Pax, in Engler's Bot. Jahrb., X. (1889), 220.—Sect. *Lutæ,* Widmer, Europ. Art. Prim. (1891), 137.

Key to the Species.

A. Leaves with a cartilaginous margin. *P. Auricula.*

B. Leaves with little or no cartilaginous margin. Bracts of involucre foliaceous. *P. Palinuri.*

Primula Auricula, L.

Bibliography and Synonymy.—*P. Auricula*, L., Sp. Pl., ed. 1 (1753), 143; Jacq., Fl. Austr. (1778), t. 415; Schmidt, Fl. Boem., II. (1793), 45, t. 170–; Lehm., Monogr. Primul. (1817), 40; Koch, Synops. Fl. Germ., ed. 1 (1837), 587; Duby, in D C. Prodr., VII. (1844), 37; Godron and Grenier, Fl. France, II. (1852), 451; Reichb., Icon. Fl. Germ., XVII. (1855), 36, t. 52; Doll., Fl. Baden (1857), 636; Baker, in Curtis Bot. Mag. (1885), t. 6837; Pax, in Engler's Bot. Jahrb., X. (1889), 224; Caruel in Parl., Fl. Ital., VIII. (1889), 625; Widmer, Europ. Art. Primul. (1891), 31.—*P. lutea*, Vill., Hist. Pl. Dauph., II. (1787), 469.—*P. alpina*, Salisb., Prodr. Stirp., Chapel Allerton (1796), 118.—*P. crenata*, Fuss., Fl. Transsylv. (1866), 536.—*Aretia auriculata*, Link, Hanb., II. (1829), 411.—*Auricula lutea*, Opiz, in Berchth. Fl. Boem., II. (1838–39), 211.

Description.—Sometimes farinose, at others without farina. Leaves from 5 to 12 cm. in length and from 2·5 to 6 cm. in breadth, fleshy, and with a cartilaginous margin with dark glands, rounded-obovate, obovate, or oblong-lanceolate, entire, denticulate or dentate, narrowed towards the base, with the apex obtuse or acute. The scape varies from 3 to 20 cm. in height, bearing an umbel of several yellow flowers, generally fragrant, but not invariably so. The bracts are broadly ovate, and from 1 to 4 mm. in length. The pedicels are from 5 to 25 cm. long. The campanulate calyx, 4 to 6 mm. long, has the lobes of a triangular lanceolate form, and is divided nearly to the middle. The tube of the corolla is from 7 to 13 mm. in length, and is longer than the calyx. The throat of the flower is farinose; and the limb of the corolla,

which has obcordate lobes, is from 15 to 25 mm. in diameter. The globose capsules are from 4 to 6 mm. long, equal to or longer than the calyx.

P. Auricula grows naturally in the crevices of calcareous rocks up to 7,000 feet, and is found on the Alpine Chain, in the Black Forest, the Apennines, and Carpathians. It varies greatly, as might be expected in a plant which is so widely scattered, and some of the local forms, described below, are worth more extended cultivation. As a rule, it has smaller flowers in nature than when cultivated, but the original or typical plants are not so much seen in gardens as formerly.

Variety *Bauhini* [Beck, Fl. Niederoesterr. (1893), 917]. This variety or subspecies is generally sold at the present time as *P. Auricula albo-marginata*, and is occasionally distributed from nurseries as *P. marginata*, although it differs very greatly from the true *P. marginata* (which see). It is a very beautiful Auricula. The leaves are densely covered with white farina, the margin being very distinctly marked with a white rim. The calyx and pedicels are also often densely covered with farina, and the whole plant is very fine with its large leaves and pleasantly odorous yellow flowers.

Under the variety *Bauhini* are included the following:

Form *typica*, Pax, variety *albo-cincta*, Widmer, Europ. Art. Primul., X. (1891), 33.—Var. *nuda*, Widmer, as above. The entire or almost entire leaves are broadly obovate or rounded-obovate. *P. A. Bauhini* is found in the Alps and Carpathians.

Form *monacensis*, Widmer, Europ. Art. Primula (1891), 33, 138. Leaves narrow, oblong, about three times as long as broad, and without farina or powder.

PRIMULA AURICULA VAR. ALBO-CINCTA, WIDMER.

PRIMULA PALINURI, PETAGNA.

P. A. monacensis is a native of turfy moors of Bavaria near Munich.

Form *serratifolia*, Rochel., Bot. Reise Banat. (1838), 12, 72. Leaves rounded-ovate, sharply and deeply edged with serrate teeth. A native of the calcareous rocks of the Banat.

Form *exscapa*, Widmer, Europ. Art. Primul. (1891), 34. A very rare form.

Variety *Widmeræ*, Pax, in Engler's Das Pflanz., IV., Primulac. (1905), 132. A variety with rather thin, hairy leaves destitute of farina, and less distinctly margined with cartilage. A native of the Black Forest near Freiburg.

Variety *Obristii* (Stein), Beck, Fl. Niederoesterr. (1893), 917.—*P. Obristii*, Stein, Samenkatalog. Bot. Gart., Breslau, 1881.—*P. similis*, Stein, as above.—*P. Auricula* × *ciliata*, Pax, in Engler's Bot. Jahrb., X. (1889), 224.—*P. Auricula* var. *Balbisii*, Beck, Fl. Niederoesterr. (1893), 917.

Leaves more or less glandular, narrower than those of *P. A. Bauhini*. Leaves edged with a cartilaginous membrane, without farina, and the margins thickly fringed with hairs. Both the calyx and pedicels are farinose. The deep golden flowers are fragrant, and the plant generally smaller than the type of *P. Bauhini*. *P. Obristii*, as it is generally called, is a native of the woodlands of Judicaria, and occurs fairly often in the Eastern Alpine Chains.

Variety *ciliata* (Moretti), Koch, Synops. F. Germ., ed. 2 (1846), 693; Reichb., Icon. Fl. Germ., XVII. (1855), 37, t. 52, f. IV.—*P. ciliata*, Moretti, in Brignat. Giorn. Fis., VIII. (1815), 127 c. icon.; Reichb., Iconogr. Bot.,

VII. (1829), 15, f. 853; Duby, in D C. Prodr., VIII. (1844), 38; Pax, in Engler's Bot. Jahrb., X. (1889), 224. —*P. Balbisii*, Lehm., Monogr. Primul. (1817), 45.—*P. nivalis*, Don ex Reichb., Fl. Excurs. Germ. (1830), 405.—*P. Auricula* subsp. *Balbisii*, Widmer, Europ. Art. Primul. (1801), 34.—*P. bellunensis*, Venzo, in Kolb. Alpenfl. (1890), 233.—*P. dolomitis*, Hort. Llewelyn, in Gard. Chron., n.s., XXI. (1884), 577 ?—*Aretia ciliata*, Link, Handb., II. (1829), 411.

Leaves without farina, the margin densely fringed with long hairs. They are short, broad, rounded, and marked with teeth. The vivid yellow flowers are free from odour, and the calyx and pedicels are without farina.

This variety is generally distributed from nurseries as *P. Balbisii* or *P. bellunensis*. The former nomenclature is partly justified by Lehmann having applied the name to this plant, and the latter is, as the bibliography shows, the one given by Venzo. It is found both on rock and on silt in the Southern Alps and the Apennines.

Primula Palinuri, Petagna.

Bibliography and Synonymy.—*P. Palinuri*, Petagna, Instit. Bot., II. (1787), 332; Tenore, Fl. Neapol., I. (1811–15), 56, t. 14; Jacq., Eclog. Plant. Rarior. t., 43 (1811–16); Tratt., Arch. ausgem. Taf., IV. (1814), t. 384; Lehm., Monogr. Primul. (1817), 43; Savi, Fl. Ital. (1818), t. 21; Hook, Exotic Fl. (1823–27), t. 118; W. J. Hook, in Curtis, Bot. Mag. (1835), t. 3414; Duby, in D C. Prodr., VIII. (1844), 37; Pax, in Engler's Bot. Jahrb., X. (1889), 224; Caruel, in Parlat. Fl. Ital., VIII. (1889), 623; Widmer, Europ. Art. Prim. (1891), 35.—*Aretia Palinuri*, Link, Handb., II. (1829), 411.

Description.—*P. Palinuri* is a handsome species of the Euauricula subsection of the section Auricula, and is one which is not very widely cultivated, although a good plant when well grown. It is not difficult to grow to perfection, as it increases quickly, spreading by means of its underground woody rhizome, and making in a comparatively short time a good specimen. Its leaves are large, both in breadth and length, being from 5 to 20 cm. long and 3 to 7 cm. broad, and are light green, fleshy, pliable, and serrated at the margin. They are quite free from farina, and are oblong or obovate in shape, tapering gradually to a petiole, sometimes of considerable length. The tall, erect scape, which is from 9 to 25 cm. in length, rises well above the leaves, and bears an umbel of nodding flowers varying in number, the maximum being about forty. The flowers are on pedicels, 7 to 20 mm. long, lengthening in fruit, these being densely covered with a mealy white farina. The outer and inner bracts, from 8 to 25 mm. long, are also thickly farinose, the outer ones large and leafy. The calyx, from 6 to 9 mm. long, is cleft to nearly half its depth, is marked by the same farinose covering, and is bell-shaped, the lobes being sharply pointed. The corolla stands well out from the calyx, and is of an intense golden yellow. The scape is one-sided, and the flowers are drooping. They are sweet-scented, like those of the Cowslip, and open in some places as early as February. The tube is 10 to 12 mm. long, and the limb from 15 to 20 mm. across, the capsule being equal to or longer than the calyx.

P. Palinuri is a rapid-growing and vigorous species, which is generally hardy in this country, although in exposed positions it may suffer from severe gales, from

which its large leaves render it specially liable to injury. It ought, therefore, to have a sheltered situation facing west. It comes naturally from the rocks, and grows in chinks on that portion of the Apennines above Cape Palinuro, in Italy. In this country it flourishes in a similar position on the rockery, and some find it does best in a vertical position. On the level or on sloping rockwork between the stones it also does well, but in this case it may be found profitable to cover the plant with a sheet of glass during the winter months. The root-stocks reach some length and are liable to be broken off, so that it is advisable to earth them up or to strike them as cuttings. This beautiful plant well repays cultivation in pots, and the protection of a cool or cold house or frame in winter. Its handsome leaves are pleasing at all times when under glass, and its flowers are purer in colour and are more prolonged in their beauty when the plant is so protected. It is said to have been introduced to cultivation in 1816, but is believed to have been in the Vienna Botanic Garden in 1813. P. Palinuri is sometimes designated "the Cape Cowslip," and also the "Italian Primrose." Propagation from seed is easy, germination being rapid.

SUBSECTION 2: BREVIBRACTEATÆ, WIDMER.

Bibliography and Synonymy.—*Brevibracteatæ*, Widmer, Europ. Art. Primul. (1891), 138.—Sect. Euauricula, Pax, in Engler's Bot. Jahrb., X. (1889), 220 *ex parte*.

Key to the Species.

A. Young leaves farinose, when full-grown margined with farina. *P. marginata.*

B. Foliage without farina.

(*a*) Leaves entire or nearly so, glabrous. *P. carniolica.*

(*b*) Leaves frequently dentate, with glandular hairs. *P. viscosa.*

Primula marginata, Curtis.

Bibliography and Synonymy.—*P. marginata*, Curtis, Bot. Mag. (1792), t. 191; Tratt., Arch. ausgem. Taf., IV. (1844), t. 376; Lehm., Monogr. Primul. (1817), 47; Loddiges, Bot. Cab., III. (1818), t. 270; Godron and Grenier, Fl. France, II. (1852), 451; Reichb., Icon. Fl. Germ., XVII. (1855), 37, t. 54, f. II.-IV.; Pax, in Engler's Bot. Jahrb., X. (1889), 224; Carucl, in Parlat. Fl. Ital., VIII. (1889), 629; Widmer, Europ. Art. Primul. (1891), 37.—*P. Auricula*, All., Fl. pedem., I. (1785), 92 *ex parte;* Villars, Hist. Pl. Dauph., II. (1787), 469.—*P. crenata*, Lam., Illustr. Genr., II. (1793); Reichb., Iconogr. Bot., VII. (1829), 18, f. 859-60.—*P. microcalyx*, Lehm., Monogr. Primul. (1817), 46, t. 4.—*Aretia crenata*, Link, Handb., II. (1829), 411.

Description.—Rhizome shrubby, long—up to 20 cm. in length—fibrous, young leaves and margins of older ones farinose, the surface of the latter sometimes losing their farina. Foliage 2 to 10 cm. long, 1 to 4 cm. broad, dotted with short glands, without cartilaginous margins, oblong or obovate, obtuse, gradually narrowing to short petioles, regularly serrated with teeth. The scape is often longer than the leaves, is from 3 to 12 cm. in length, and bears an umbel composed of from two to twenty flowers. The bracts and pedicels are farinose, the former being broadly ovate, short, and leafy. The pedicels are from

5 to 22 mm. long. The farinose calyx is from 3 to 5 mm. in length, campanulate in form, purplish, and cut to near the middle with triangular lobes. The corolla is of a bluish-lilac, the limb is usually broadly funnel-shaped, rarely flat, and is from 18 to 28 mm. in diameter, with marginate lobes. The tube is much longer than the calyx, and gradually widens out at the top. The capsule is equal to or greater than the calyx.

Primula marginata is an abundant species in the Cottian and Maritime Alps. It is as plentiful on the granite as the limestone, and it flourishes either in shade or in sun. In nature, however, it apparently evinces a preference for shade, and this should be taken into account by cultivators in this country. It will, nevertheless, thrive in practically any soil, but it has a decided preference for a certain position when on rockwork. This is an elevated place, where its rhizomes will be able to hang over the rocks or stones in their natural manner. It will grow in the level, and is a good moraine plant, but when cultivated in this manner it requires to have the soil or gravel drawn up about the plant when the rhizomes become long. Failing this, the plants ought to be lifted immediately after flowering and replanted deeper—*i.e.*, so that the leaves just rest on the ground. It is a most accommodating plant, but it is surely desirable that it should have every opportunity of exhibiting its real value, and this can only be done by cultivating it on rockwork and placing it in the way suggested by its natural habits.

P. marginata, which flowers in March and April, is a variable species both as regards size of leaf and colour of flower. In colour it ranges from rich violet to white, and some good forms have been selected.

P. marginata var. Linda Pope, as will be seen from the

PRIMULA MARGINATA, CURTIS.

PRIMULA MARGINATA VAR. LINDA POPE.

illustration, is probably the most outstanding and remarkable form of P. marginata. Though I do not know the origin of this plant, I am inclined to think it is a hybrid between P. marginata and an Alpine Auricula. I have in my possession a hybrid between P. marginata and a border Auricula, and on the result of this cross I base the above opinion. It has very large deeply serrated leaves, with white margins and densely covered with farina. Unlike most forms of P. marginata, the scape is erect and not drooping, and carries a head of large flat flowers of a fine lilac with a circular white eye. In a young state the colour is considerably darker than the shade the flower assumes when it is fully open. Under the name of *P. Salamoni*, a Primula is cultivated which appears to be P. viscosa with some P. marginata " blood " in it.

Primula carniolica, Jacq.

Bibliography and Synonymy.—*P. carniolica*, Jacq., Misc. Austr., I. (1778), 160; Fl. Austr., V. (1878), 28, app., t. 4; Lehm., Monogr. Primul. (1817), 72; Reichb., Icon. Bot., VII. (1829), 13, f. 629; Koch, Synops. Fl. Germ., ed. 1 (1837), 589; Duby, in D C. Prodr., VIII. (1844), 37; Reichb., Icon. Fl. Germ., XVII. (1855), 37, t. 53; Pax, in Engler's Bot. Jahrb., X. (1889), 225; Caruel, in Parl., Fl. Ital., VIII. (1889), 628; Widmer, Europ. Art. Primul. (1891), 39; Derganc, in Acta Horti Jurjev., II.-III. (1901), 153, u. 27, ex Bot. Centralbl., XCIII. (1901), 494.—*P. carniolica* var. *multiceps*, Duby, in D C. Prodr., VIII. (1844), 38.—*P. integrifolia*, Scopoli, Fl. Carn., ed. 2, I. (1772), 133.—*P. Freyeri*, Hladnik, Hoppe ex Duby, as above.—*P. Jellenkiana*, Freyer ex Reichb., as above.—*P. multiceps*, Freyer ex Duby, as above.—*P. grandiflora*,

Bast. ex Ind. Kew., III., 625.—*Aretia carniolica*, Link, Handb., II. (1829), 412.

Description.—The plant is without farina except for a coating round the mouth of the corolla. The smooth and slightly waved leaves are from 3 to 15 cm. in length, and about 1 to 4·5 cm. in breadth. The colour is a pleasing shade of green, and they have a slight cartilaginous margin with occasionally a few glandular hairs. They are obovate or oblong, obtuse or acute, narrowing to a distinct petiole, and are usually entire, though at times a little subdentate. The scape, which is smooth and inclined to be reddish in hue, is from 8 to 25 cm. in length, and rises well above the leaves, bearing an umbel of several flowers. The bracts are from 1 to 4 mm. long, acute or obtuse, and broadly ovate in form. The pedicels are from 3 to 24 mm. long, extending when in fruit. The calyx is about 5 to 6 mm. long, cut to about the middle, the campanulate lobes being acute or subobtuse. The corolla is of a beautiful rose pink or pale lilac, with a white farinose eye, and has long tubes, from 6 to 10 mm. in length, much longer than the calyx. The limb of the corolla is from 14 to 25 mm. across, is broadly funnel-shaped, with obcordate lobes. The capsule equals or often exceeds the calyx.

P. carniolica is a native of the Maritime and Cottian Alps. It occupies only a limited area, and is but sparsely distributed there. It flourishes best in its native habitats in dense shade among moss, and in woods and copses under cool conditions everywhere, or even on shady, damp rocks, although not a saxatile species. In grass or among stones it is unhappy-looking. In cultivation it is not difficult, but it does best cultivated in turfy loam with some leaf soil and peat added in a shady position.

Primula viscosa, All.

Bibliography and Synonymy.—*P. viscosa*, All., Fl. Pedemont., I. (1785), 93, t. 5, f. 1; Lehm., Monogr. Prim. (1817), 71; Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 123 in not.; Pax, in Engler's Bot. Jahrb., X. (1899), 228.—*P. hirsuta*, Vill., Hist. Pl. Dauph., II. (1787), 469.—*P. latifolia*, Lapeyr., Hist. abrg. pl. Pyren. (1813), 97; Reichb., Iconogr. Bot., VII. (1829), 18, f. 858; Koch, Synops. Fl. Germ., ed. 2 (1846), 695; Godron and Grenier, Fl. France, II. (1852), 452; Reichb., Icon. Fl. Germ., XVII. (1855), 41 (under *P. viscosa*), t. 57, f. I.-III. (under *latifolia*); Caruel, in Parl., Fl. Ital., VIII. (1889), 634; Widmer, Europ. Art. Prim. (1891), 40; Bubani, Fl. Pyren., I. (1897), 226; Keller u. Schinz, Fl. Schweiz. (1900), 386.—*P. alpina*, Loisel., Fl. Gall., ed. II. (1828), I. 160, ex Ind. Kew.

Description.—Without farina. Leaves from 5 to 18 cm. in length, and from 1 to 5 cm. broad, of a yellowish-green and rather strongly odorous. They are subflaccid and sometimes curved, and densely covered with short colourless glands. In form they are rather oval-shaped or oblong-cuneate or lanceolate-cuneate obtuse, or acute, and gradually narrowing into a petiole, either entire or toothed. The glandular scape, from 5 to 18 cm. in height, rises above the leaves, carrying an umbel of several flowers. The bracts are broadly ovate. The pedicels are from 5 to 18 mm. long, and lengthen when in fruit. The flowers are reddish-violet, are without scent (according to some they are scented), and are disposed on a somewhat nodding one-sided umbel. The calyx is from 3 to 5 cm. long, and is glandular, and occasionally slightly farinose, narrowly bell-shaped, and cut from the middle

into acute or subacute lobes. The corolla has a tube exceeding the length of the calyx, rather cylindrical and sparsely furnished with very short glands. The throat is very slightly farinose. The limb of the corolla is somewhat funnel-shaped, and is about 15 mm. across. The seed vessels are from 4 to 6 mm. long, exceeding the calyx.

P. viscosa (P. viscosa of Allioni and P. latifolia of Laperouse) must on no account be confused with the *P. viscosa* of gardens, a set of plants mostly composed of varieties of *P. hirsuta*. In nature it exists in almost all parts of the mountainous districts of Southern Europe, from the Pyrenees to the Rhætian Alps. It is exceedingly varied and confusing in its forms, but those named below have been described by botanists, though not differing materially from each other. These are:

Form *pyrenaica*, Pax. Leaves larger and broader, broadly ovate or broadly oblong-ovate, with very large teeth. Umbel with many flowers. From the East Pyrenees.

Form *cynoglossifolia*, Widmer, Europ. Art. Primul. (1891), 40, 140. Leaves smaller, entire or only slightly toothed, oval or oblong. Umbels with several flowers. A native of the Maritime Alps.

Form *graveolens* (Hegetschw. and Heer), Pax.—*P. graveolens*, Hegetschw. and Heer, Fl. Schweiz. (1840), 194, t. 6.—*P. latifolia* var. *cuneifolia*, Widmer, Europ. Art. Prim. (1891), 40, 140. Leaves still smaller, oblong or lanceolate, narrowed to the base, and toothed from the middle to the apex. Umbel with several flowers. A native of the Engadine. Though it is not found on limestone in its native habitats, *P. viscosa* does not object to lime with us.

SUBSECTION 3: ARTHRITICA, SCHOTT.

The leaves of the plants in this subsection are characterised by being firm, tough, shiny, pointed, and entire. The margin is cartilaginous. The bracts are long and narrow. The calyx is long, and the colour of the flowers is generally rose, although varying to lilac or purple. The character of the leaves points to their ability to stand a considerable amount of sun. In their native habitats they court the full glare of the sun's rays, and in cultivation they ought to have a similar position. The species and their varieties prefer rocks, and should be planted in the fissures.

Key to the Species.

A. Leaves pitted, viscid, green, broadly margined with a cartilaginous margin. *P. spectabilis.*

B. Leaves not pitted.

(*a*) Leaves glabrous glaucous, broadly margined with cartilaginous margin. *P. glaucescens.*

(*b*) Leaves margined, glandular, and pilose.

(*α*) Leaves stiff, glaucous, broadly margined. *P. Wulfeniana.*

(*β*) Leaves slightly stiff, green, narrowly margined. *P. Clusiana.*

Primula spectabilis, Tratt.

Bibliography and Synonymy.—*P. spectabilis*, Tratt., Arch. ausgem. Taf., IV. (1814), 426, t. 377; Schott, Wilde Blendl. Oesterr. Prim. (1852), 16, t. 4; Reichb., Icon. Fl. Germ., XVII. (1855), 43, t. 64; Walpers, Annal, V. (1858), 466; Pax, in Engler's Bot. Jahrb., X. (1889),

226, excl. subsp.; Parl., Fl. Ital., VIII. (1889), 640 *ex parte;* Widmer, Europ. Art. Primul. (1891), 73.—*P. integrifolia,* Tausch. in Flora, IV. (1821), 364.—*P. carniolica,* Pollini, Fl. Veron., I. (1822), 231.—*P. calycina,* Reichb., Iconogr. Bot., I. (1823), t. 34.—*P. glaucescens,* Reichb., Fl. Germ. Excurs. (1830), 403 *ex parte.*—*P. Polliniana,* Moretti, Prim. Ital. (1831), 12; Duby, in D C. Prodr., VIII. (1844), 40.—*P. spectabilis* var. *denticulata,* Koch, Synops. F. Germ., ed. 1 (1837), 389.—*P. baldensis,* Goiran ex Parlat., Fl. Ital., VIII. (1889), 641.—*P. Parlatorei,* Caruel, in Parlat., Fl. Ital., VII. (1889), 641.—*Aretia spectabilis,* Link, Handb., II. (1829), 412.

Description.—Non-farinose. Leaves 3 to 9 cm. long, 1 to 4 cm. broad, stiff, brilliant glossy green, viscid, with small pellucid glands or pittings on the upper surface. They are broadly margined with a cartilaginous margin, and are entire and oblong or rhomboid oblong, acute or subacute. The scape is equal or superior in length to the leaves, and carries an umbel of pedicellate flowers, numbering usually from one to seven. The linear acute bracts, 3 to 14 mm. long, are reddish. The campanulate tubular calyx, 8 to 11 mm. long, is entire or slightly cut, and with purplish lanceolate or obtuse lobes. The corolla is rose-coloured, with the limb broadly funnel-shaped and from 2 to 3 cm. in diameter. Capsules about 6 mm. long, not rising above the calyx.

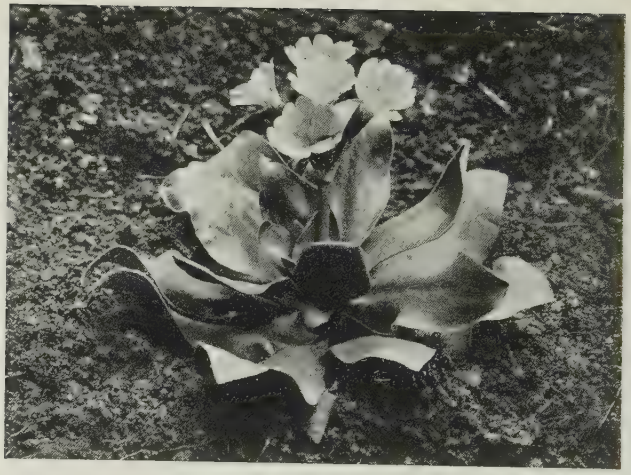
This species occurs on calcareous and granite rocks in the South Austrian Ural Alps, the Judicarian, and the Veronese Alps at a height of 500 to 22,000 metres.

It is still moderately rare in cultivation, and some prefer to cultivate it in a half-shaded position, but it is amenable to either method. Its soil requirements are equally easy, and it will thrive in almost any compost.

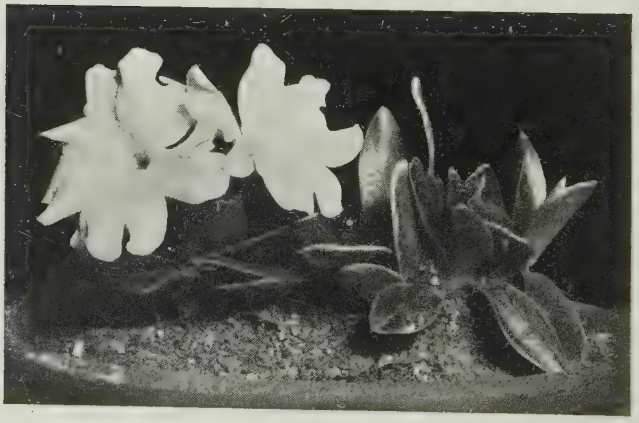
PRIMULA SPECTABILIS, TRATT.

PRIMULA TYROLENSIS, SCHOTT.

See page 112.



PRIMULA GLAUCESCENS, MORETTI



PRIMULA WULFENIANA, SCHOTT.

Primula glaucescens, Moretti.

Bibliography and Synonymy.—*P. glaucescens*, Moretti, in Brugnat. Giorn. Fis, II. (1822), 249; Reichb., Fl. Germ. Excurs. (1830), 403 *ex parte;* Reichb., Icon. Fl. germ., XVII. (1855), 44, t. 58 (sub. *P. calycina*); Pax, in Engler's Bot. Jahrb., X. (1889), 226.—*P. lævigata*, Duby ex Reichb., Fl. Exc. Germ. (1830), 403.—*P. calycina*, Duby, in Gaud., Fl. Helvet., II. (1828), 94; in D C. Prodr., VIII. (1844), 40; Widmer, Europ. Art. Primula (1891), 74.

Description.—The plant is non-farinose and glabrous. It varies considerably in height, and also in the size of the leaves. Under favourable conditions it is 5 inches high, and produces foliage of about the same length, but it may be little more than a third of this under certain circumstances. The stiff, smooth, sea-blue green leaves, 3 to 10 cm. long, are in form lanceolate or narrowly oblong, sharp-pointed or subobtuse, and broadly margined with a cartilaginous margin. The scape rises above the leaves, is from 5 to 13 cm. long, and bears an umbel carrying from two to six flowers. The bracts are reddish, linear in form, and soft, 0·5 to 3 cm. long.

The flowers are borne on pedicels 5 to 20 mm. long. The tubular calyx, 8 to 20 mm. long, is lobed to the middle or rather deeper. The lobes are lanceolate or oblong, pointed or subacute. The corolla is variously coloured, but is generally rose, lilac, or purple, with the throat scattered with small glands. The limb is rather funnel-shaped and from 2 to 3 cm. in diameter, with obcordate emarginate lobes. The oblong capsules do not rise above the calyx.

This is a handsome and easily cultivated Primula, which gives but little trouble in our gardens, and flourishes in a

sunny and well-exposed position on rockwork. Although a native of the southern slopes of the Italian Alps, it is quite hardy with us. It is *P. calycina* of commerce. There is a marked difference in the habit of the foliage between this species and its ally, *P. spectabilis*. The leaves of P. glaucescens have a tendency to curl inwards, while those of P. spectabilis have an inclination to curl backwards.

There are two recognised varieties. These are:

Subsp. I.: *calycina* (Duby), Pax.—*Aretia glaucescens*, Link, Handb., II. (1829), 412. This variety or subspecies is more robust in every way, and has large leaves and a larger calyx. It is found in several districts of the southern Italian Alps.

Subsp. II.: *longobarda* (Porta), Widmer, Europ. Art. Primul. (1891), 72.—*P. longobarda*, Porta, in Huter. Cat. pl. exsicc., 1882; Kerner, Sched. ad Fl. Exs. Austr.-Hung., IV. (1886), 50; Caruel, in Parlatore, Fl. Ital., VIII. (1889), 643.—*P. spectabilis*, subsp. *longobarda*, Pax, in Engler's Bot. Jahrb., X. (1889), 226. A smaller form. The calyx is from 7 to 9 cm. long, divided to the middle, lobes acute or obtuse. Limb about 2 cm. across. Lobe of corolla above the calyx.

From the Judicarian and Bergamasker Alps, in rocks and on the grassy mats, at a height of 2,000 metres or higher.

Primula Wulfeniana, Schott.

Bibliography and Synonomy. —*P. Wulfeniana*, Schott, Wilde, Blendl. Oesterr. Prim. (1852), 17, t. 6; Walper's Ann., V. (1858), 466; Reichb., Icon. Fl. Germ., XVII. (1855), 442, t. 63; Caruel, in Parlat., Fl. Italian, VII. (1889), 642; Pax, in Engler's Bot. Jahrb., X. (1889),

226; Widmer, Europ. Art. Primul. (1891), 70; Paulin, Schedæ ad Fls. exs. Carniol, I., (1901), 82; Derganc, in Kneucker, Allg. bot. Zeitschr., X. (1904), 76.—*P. calycina*, Reichb., Fl. Germ. Excurs. (1830), 403 *ex parte*.—*P. glaucescens*, Reichb., Fl. Germ. Excurs. (1830), 403 *ex parte*.—*P. integrifolia* var. *uniflora*, Scopoli, Fl. Carn., ed. 2, I. (1772), 134.—*P. integrifolia*, Reichb., Fl. Germ. Excurs. (1830), 403 *ex parte*.—*P. spectabilis*, Josch., Fl. Karnthen (1853), 88 *ex parte*; Maly, Fl. Steiermark (1868), 115.—*P. spectabilis* var. *denticulata*, E. Weiss, in Oesterr. bot. Zeitschr., IX. (1859), 125.—*P. carniolica*, Wulfen., Fl. Nor. (1858), 247 *ex parte*.—*P. Clusiana*, E. Weiss, in Oesterr. bot. Zeitschr., IX. (1859), 125.

Description.—This species is not difficult to cultivate in this country. It does best in turfy loam, but it thrives also well on rockwork in the fissures of the stones. In nature it grows in meadows and on ridges on the Venetian, Carnic, and Julian Alps, being found there in matted tufts, and often growing along with Gentiana Frœlichii. It is extremely brilliant and beautiful.

It is easily recognised from P. glaucescens by its smaller growth and more tufted habit. The leaves, which are usually from 2 to 5 cm. in length and 0·5 to 1 cm. broad, are stiff, narrowish, and pointed. They are of a deep, glaucous, shining green, non-viscid, and the stiff, broad, membraneous margin is minutely glandular at the edge. In a young state the leaves incline to curl inwards laterally. They are elliptical or oblong in form, rarely lanceolate and acute. The flower scape is about 1 to 5 cm. in length, and carries from one to three flowers. The flowers are of a bright rose or rosy mauve, and are white-throated. The stem is reddish, and occasionally shows signs of farina. The calyx lobes in this species

differ from those of P. glaucescens. Those of the latter are acute or almost acute, oblong-lanceolate, and equal or exceed half the length of the calyx, while in Wulfeniana they are shorter than half the length of the calyx, and are obtuse and broadish.

The other dimensions are: Bracts 1 to 12 mm. long; pedicels 2 to 8 mm. long; calyx 7 to 9 mm. long; corolla limb 2·5 to 3 cm. across; capsules about 6 mm. in length, not rising above the calyx.

Primula Clusiana, Tausch.

Bibliography and Synonymy.—*P. Clusiana*, Tausch., in Flora, IV. (1821), 364; Schott, Wilde Blendl. Oesterr. Primlen. (1852), 17, t. 5; Reichb., Icon. Fl. Germ., XVII. (1855), 43, t. 58, f. II.; Pax, in Engler's Bot. Jahrb., X. (1889), 225; Widmer, Europ. Art. Primul. (1891), 69; Beck, Fl. Niederoesterr. (1893), 918.—*P. integrifolia*, L., Spec. pl., ed. 1 (1733), I., 144 *ex parte;* Jacq., Fl. Austr., IV. (1776), t. 327; Sims, in Curtis, Bot. Mag. (1806), t. 942 ?; Lehm., Monogr. Primul. (1817), 73 *ex parte;* Reichb., Iconogr. Bot., I. (1823), f. 69.—*P. spectabilis*, Mert., et Koch in Roehl. Deutschl. Fl., II. (1826), 116.—*P. Clusii*, Weist ex Gaud., Fl. Helvet., II. (1828), 94.

Description.—This is a very pretty and easily cultivated species, and is considered by many cultivators one of the best of the Arthritica section. It is one of the least captious in its demands, and appears to flourish equally well in the border, on the flat part of the rockery, or in the crevices of the rocks. Gritty calcareous loam is suitable, and it will thrive in sun or shade. The leaves are of large size, from 1·5 to 9 cm. in length, and from 1 to 3 cm. broad, and much lighter in colour than those of *P. Wulfeniana*. They are oblong or ovate, entire,

PRIMULA CLUSIANA, TAUSCH.

PRIMULA FACCHINI, SCHOTT.

See page 156.

PRIMULA PEDEMONTANA, THOMAS.

PRIMULA œNENSIS, THOMAS

smooth, slightly stiff and glossy, and having the cartilaginous margin narrow and ciliated at the edge. They more nearly resemble the foliage of P. spectabilis than those of P. glaucescens, but they have no pitting, are ciliated, and have a narrow membraneous band. The flower scape varies in height from 2 to 11 cm. in length, and bears an umbel of from one to six rose or lilac flowers. The corolla lobes are bifid, not emarginate, as in the case of the other species of this section. The pedicels are from 5 to 10 mm. long; the calyx 10 to 14 mm. long; and the limb of the corolla is from 2·5 to 3 cm. in diameter. The capsule is from 5 to 7 mm. long, and does not rise above the calyx.

P. Clusiana may be said to represent the Arthritica Primulas in the limestone ranges of Austria, from Vienna on the east to Salzburg on the west. Pax is of opinion that Kotschy's record of this Primula from Transylvania is unfounded.

SUBSECTION 4: ERYTHRODROSUM, SCHOTT.

Key to the Species.

A. Leaves glabrous or subglabrous, margin thickly glandulose and ciliated with reddish hairs. *P. pedemontana.*

B. Leaves thickly glandular and pilose.

(*a*) Flowers on short pedicels, pedicels less than 10 mm. Scape equal to the leaves or frequently rising above.

a Leaves oblong or ovate, entire or minutely and obtusely denticulated at the point. Pubescence thick and short. *P. apennina.*

β Leaves narrow and wedge-shaped. Pubescence thick and short. *P. œnensis.*

γ Leaves oblong or ovate on short, narrow petioles, shortly and thickly toothed. Pubescence thick and rather long. *P. villosa.*

δ Leaves broadly ovate on thickish, narrowed petioles, toothed. Pubescence very thick and long. *P. cottia.*

(*b*) Flowers on longer pedicels, pedicels 5 to 17 mm. in length. Scape shorter than the leaves or equal. *P. hirsuta.*

Primula pedemontana, Thomas.

Bibliography and Synonymy. — *P. pedemontana,* Thomas, Catal. pl. Suisess (1818), 24; Reichb., Fl. Germ. Excursus (1830), 403; Koch, Synops. Fl. Germ., ed. 1 (1837), 588; Reichb., Icon. Fl. Germ., XVII. (1855), 39, t. 57, f. V.; Hook, f. in Curtis, Bot. Mag. (1869), t. 5794; Pax, in Engler's Bot. Jahrb., X. (1889), 229; Caruel, in Parlatore, Fl. Italian, VIII. (1889), 636; Widmer, Europ. Art. Primul. (1891), 46.—*P. glandulosa,* Bonjean, in Sched. (1806).—*P. pubescens,* Reichb., Iconogr. Bot., VII. (1829), 17, f. 856, 857.—*P. villosa* var. *glandulosa,* Duby, in D C. Prodr., VIII. (1844), 38.—*P. Bonjeani,* Huguenin ex Nyman, Consp. (1878–82), 605.—*P. latifolia* var. *pedemontana,* Arcangeli, Fl. Italian, ed. 2 (1894), 452.

Description.—Leaves 2 to 10 cm. long, 1 to 3 cm. broad, obovate or oblong-lanceolate, usually gradually narrowing into a petiole, acute or obtuse, entire or toothed, smooth, shining, slightly glandular or glabrous. Margin densely ciliated with short red glands. Scape rising above the leaves to a height of about 15 cm., glandular,

bearing an umbel of a number of flowers, although sometimes only one is borne in small plants; bracts scarious, ovate, obtuse, 1 to 2 mm. in length; pedicels 3 to 15 mm. long, with long fruits; calyx glandular, 4 to 6 mm. in length, tubular, bell-shaped, entire or with slightly cleft triangular lobes, acute or obtuse. Corolla bright rose, occasionally with a white tube; the throat is white.

Primula pedemontana is one of the most distinct of this section, and is a plant which well repays the attention of its cultivator. It will flourish in a good loamy soil with a position facing the full south. It is very beautiful where it does well, the brilliant rose flowers showing well on their scape of about 6 inches high. Some grow it well in half shade in light soil in fissures of rock. It is a native of the Graian and Cottian Alps.

Primula apennina, Widmer.

Bibliography and Synonymy.—*P. apennina*, Widmer, Europ. Art. Primul. (1891), 48, 140.—*P. hirsuta*, Arcangeli, Fl. Italian (1882), 568 *ex parte*.—*P. villosa*, Parl., Fl. Italian, VIII. (1888), 631 *ex parte*; Arcangeli, Fl. Italian, ed. 2 (1894), 452 *ex parte*.

Description.—Leaves about 2·5 to 6·5 cm. long and 0·8 to 2·5 cm. broad, ovate, oblong or lanceolate-cuneate, usually gradually narrowing into a petiole, obtuse, entire, or the apex slightly furnished with small or larger teeth, and covered densely with large yellowish-brown glands. The scape is generally a little more than twice the height of the leaves or 2·5 to 9 cm. long, and carries an umbel of from one to eight flowers. The scarious bracts, 1 to 3 mm. long, are ovate or rounded. The calyx, 4 to 6·5 mm. long, is glandular, and is lobed to about a quarter or half

its length; pedicels 3 to 10 mm. long. The flowers are of a delicate pink or rose, with a white eye. The capsules are from 3 to 4·5 mm. in length, enclosed in the calyx.

It is a native of the Northern Apennines. It is a sun-loving plant, but in cultivation it seems to do best in half shade. Its cultivation is not yet very well understood.

Primula œnensis, Thomas.

Bibliography and Synonymy.—*P. œnensis*, Thomas ex Schott, on Oesterr. bot. Wochenbl., II. (1852), 36; Parl., Fl. Italian, VIII. (1889), 637; Pax, in Engler's Bot. Jahrb., X. (1889), 227; Widmer, Europ. Art. Primul. (1891), 49.—*P. villosa* var. *daonensis*, Leybold, in Oesterr. bot. Wochenbl., IV. (1854), 10.—*P. daonensis*, Leybold, in Flora, XXXVIII. (1855), 345, t. XII.; Reichb., Icon. Fl. Germ., XVII. (1855), 39, t. 55, f. III.-V.—*P. stelviana*, Vulp., in Flora, Neue Reihe, XVI. (1858), 549 (err. typ. 249).—*P. Pooliana*, Brügger, in Sched.—*P. cadinensis*, Porta, in Dorfler, Herb. Norm., n. 3374.—*P. Plantæ*, Brügger, in Jahrb. naturf. Ges. Graubundt., XXIII.-XXIV. (1880), 100.—*P. hirsutax œnensis*, Pax, in Engler's Bot. Jahrb., X. (1889), 227 (*P. Plantæ*).

Description.—Leaves 1·5 to 6 cm. long, 0·6 to 2 cm. broad, very viscid, densely covered with large red glands, oblong-cuneate, gradually tapering into a petiole, obovate or truncated, slightly toothed on the anterior margin, never entire. Scape generally rising above the leaves, rarely equal or less than these, bearing an umbel of from one to seven flowers; bracts scarious, broadly ovate. Calyx densely glandular, divided to about half its length, tubular, campanulate, with ovate, obtuse lobes. Corolla rose, throat white. Lobes of limb obcordate without margin.

Primula œnensis is a native of the Rhætian Alps, and is a saxatile species, thriving best in rocks or in a stony soil. It does well in the same positions as P. apennina.

Primula villosa, Jacq.

Bibliography and Synonymy.—*P. villosa*, Jacq., Fl. Austr., II. (1778), 41, t. 27; Widmer, Europ. Art. Primul. (1891), 51.

Description.—Leaves 3 to 17 cm. in length, 1 to 4 cm. in breadth, densely covered with red glands, and very sticky. They are broadly obovate, or oblong, or oblong-lanceolate, gradually or suddenly tapering into a thin petiole, obtuse usually, pretty regularly toothed from the middle or sometimes almost entire. The pubescence is longer than in P. œnensis. The scape, from 3 to 15 cm. high, is covered with reddish glands, and rises well above the leaves, bearing from one to twelve flowers in an umbel. The bracts are green or scarious, broadly ovate, obtuse, 1 to 3 mm. in length; the pedicels, 2 to 7 mm. long, a little longer in fruit. The calyx is glandular, 4 to 6 mm. long, entire, or divided from the middle into short lobes, triangular in form, and acute or obtuse. The corolla, which is 10 to 13 mm. in length, is rose or lilac, with a glandular white throat, the limb 20 to 30 mm. in diameter, with obcordate emarginate lobes. Capsule nearly equal to the calyx or a little shorter.

It is a native of the Eastern Alps. P. villosa will thrive under the same cultivation as the preceding species.

Subspec. Jacquini, Pax.—*P. villosa*, Jacq., *l.c.*; Schott, in Oesterr. bot. Wochenbl., II. (1852), 35; Reichb., Icon. Fl. Germ., XVII. (1855), 38, t. 66; f. 4-5; Pax, in Engler's Bot. Jahrb., X. (1889), 227.—*P. Simsii*, Sweet, Hort.

Brit., ed. I. (1827), 330?—*P. hirsuta*, Reichb., Iconogr. Bot., VII. (1829), 16, f. 854?—*Aretia villosa*, Link, Handb., II., (1829), 411?

Leaves broadly ovate or oblong-ovate, narrowing into short or very short petioles, slightly toothed, 3 to 8 cm. long, 1 to 3 cm. broad.

This subspecies is of doubtful distinctness, and in cultivation is not distinguishable. It is also recorded from the Eastern Alps.

Subspecies *P. commutata*, found in Steiermark, also differs little from the type, but has thinner and bigger leaves, and these frequently oblong and coarsely toothed. Cultivation and position as in P. villosa.

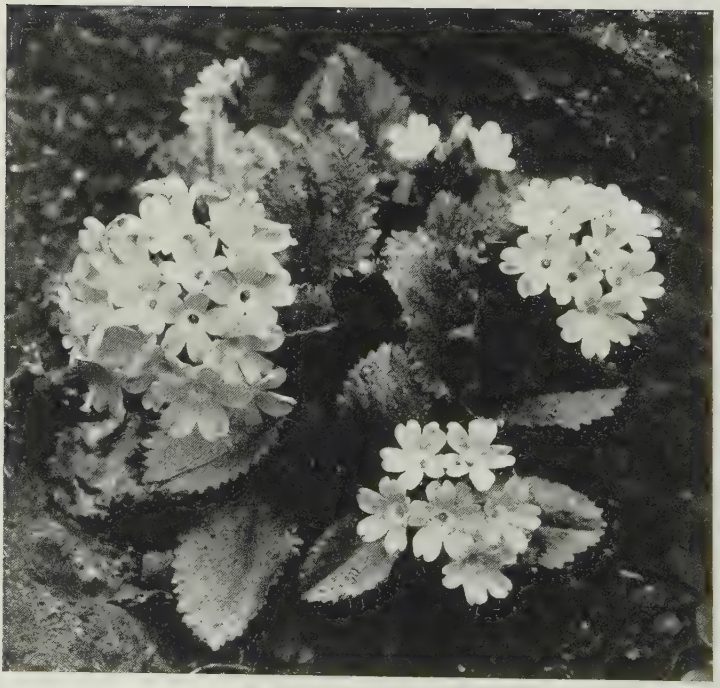
P. villosa and its forms are found on shady granitic rocks, more rarely on limestone; also on banks, and occasionally on stony pastures.

Primula cottia, Widmer.

Bibliography and Synonymy.—*P. cottia*, Widmer, in Flora, LXXIII. (1889), 71; Europ. Art. Primul. (1891), 54, 141; Correvon, in Gard. Chron., XXXVII. (1905), 130. —*P. hirsuta*, All., Fl. Pedem., I. (1785), 93 *ex parte*.—*P. villosa*, Parl., Fl. Italian, VIII. (1889), 631 *ex parte*.

Description.—Leaves 3 to 8 cm. long, 1 to 3 cm. broad, obovate or oblong, gradually or suddenly tapering into a petiole, more or less obtuse; denticulate from the middle, occasionally entire. Densely covered with red glands, sticky, pubescence dense and long. Scape usually rising above the leaves, and from 5 to 12 cm. high, glandular, bearing an umbel of from two to twelve flowers. Bracts 1 to 3 mm. long, somewhat scarious, obtuse. Calyx 4 to 6 mm. long, glandular, with bell-shaped tri-

PRIMULA VILLOSA, JACQ.



PRIMULA HIRSUTA, ALL.

angular lobes, obtuse or subobtuse. Corolla rose-coloured, with tube rising well above the calyx, throat glandular, limb 20 to 30 mm. in diameter, lobes obcordate, emarginate. Capsule often equalling the calyx or sometimes shorter.

This Primula is limited in its distribution, and is practically confined to different parts of the Cottian Alps, where it extends from a height of 1,600 to 2,800 metres. It grows in the rocks and stony meadows.

P. cottia much more closely resembles *P. villosa* than *P. hirsuta*. It is an attractive plant which is not specially difficult to cultivate under the same conditions as the others of the same section, and can stand a good deal of sun.

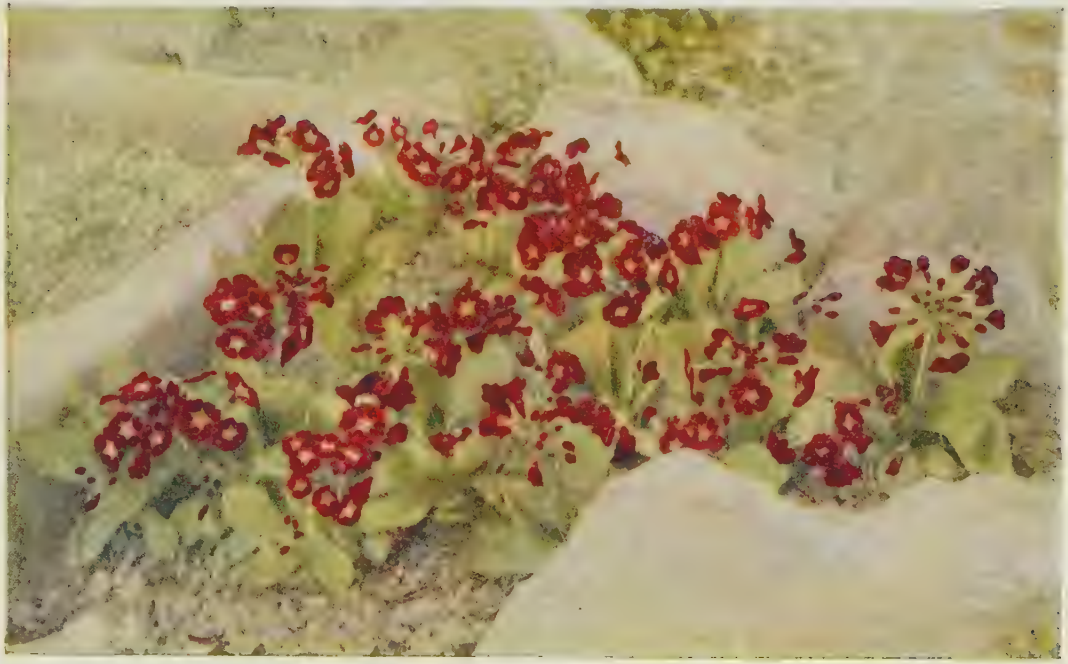
Primula hirsuta, All.

Bibliography and Synonymy.—*P. hirsuta*, All., Fl. Pedem., I. (1785), 93 *ex parte;* Reichb., Fl. Germ. Excurs. (1830), 404; Reichb., Icon. Fl. Germ., XVII. (1855), 40. t. 56 (sub. *P. villosa*); Kerner, in Oesterr. bot. Zeitschr.; XXV. (1875), 124; Pax, in Engler's Bot. Jahrb., X. (1889), 227.—*P. viscosa*, Vill., Hist. pl. Dauph., II. (1787), 467, Gaud., Fl. Helvet., II. (1828), 89; Reichb., Fl. Germ. Excurs. (1830), 403; Godr. et Grenier, Fl. France, II. (1852), 451; Widmer, Europ. Art. Primul. (1891), 55.—*P. villosa*, Curtis, Bot. Mag. (1787), t. 14; Lapeyr., Hist. abrégé pl. Pyrén. (1813), 96; Lehm., Monogr. Primul. (1817), 77?; Loddiges, Bot. Cab., III. (1818), t. 182; Reichb., Iconogr. Bot., VII. (1829), 16, f. 855; Koch, Synops. Fl. Germ., ed. 1 (1837), 588 *ex parte;* ed. 2 (1846), 694 *ex parte;* Duby, in D C. Prodr., VIII. (1844), 38; Regel, in Gartenflora, XIX. (1870), 197, t. 656; Parl., Fl. Italian, VIII. (1889), 631 *ex parte;* Bubani, Fl. Pyren., I. (1897), 227.—*P. ciliata*, Schrank, Primit. Fl. Salisburg. (1792), 64; Reichb., Icon.

Fl. Germ., XVII. (1855), 40, t. 62, f. V.—*P. pubescens*, Loiseleur, Fl. Gallica, ed. 1 (1806), 114.—*P. decora*, Sims, in Curtis, Bot. Mag. (1817), t. 1922.—*P. pallida*, Schott, in Oesterr. bot. Wochenbl., II. (1852), 35.—*P. confinis*, Schott, in Reichb., Icon. Fl. Germ., XVII. (1855), 40, t. 62, f. II.; Parl., Fl. Italian, VIII. (1889), 633.—*P. decipiens*, Stein.—*P. Nelsoni*, Hort. ex Stein, in Samenkatal. bot. Gart. Breslau (1881).

Description.—Leaves 3 to 15 cm. long, 1 to 4 cm. broad, very sticky, densely covered with yellow or gold, sometimes reddish, glands, broadly obovate or rhomboid, occasionally almost wedge-shaped, tapering down suddenly into a petiole, obtuse, coarsely toothed, either all the margin or only from the centre. Scape glandular. Bracts scaly, broadly ovate, obtuse. Pedicels 6 to 10 mm. long, thread-like; scape shorter than the leaves or equal, 7 cm. high or less. Calyx 3 to 7 mm. long, broadly bell-shaped, glandular to the middle or deeply cut into triangular lobes, acute or subobtuse. Corolla rose, lilac or white, tube rising well above the calyx frequently, with the limb white or paler than the corolla, throat glandular, white, widening out slightly, the lobes of the limb obcordate emarginate, 15 to 25 cm. in diameter. Capsules 3 to 5 mm. long, not rising above the calyx.

This species and its varieties are found wild in the Pyrenees, the Central Alps, and South Tyrol. It is frequently met with in gardens under the name of *P. viscosa*, but one of the most distinguishing features is that *P. hirsuta* has a short glandular scape, which is frequently, indeed, shorter than the leaves, whereas in P. viscosa the scape is longer than the leaves and the flowers droop to one side. There are many varieties, varying in shade, some of them very beautiful indeed.



P. HIRSUTA, THE GENERAL.

Of these varieties the following, recognised by Pax, may be mentioned:

P. hirsuta var. *angustata,* Widmer: The leaves of this are oblong, and gradually narrow into a petiole. The flowers are rose-coloured, and the scape is evolute. From the Rhætian Alps.

P. hirsuta var. *exscapa,* Pax: In this the leaves are almost sessile, and the scape is extremely short or absent. From Mount Javernaz.

P. hirsuta var. *nivea:* This is a lovely garden form with white flowers.

Quite a number of garden varieties are in cultivation, often under the name of *P. ciliata,* with garden names in addition. We may name *P. hirsuta* or *ciliata,* The General, a pleasing form, thrum-eyed, raised by the late Dr. Stuart of Chirnside; *P. h. coccinea,* pin-eyed; *P. h. Balfouri,* perhaps the best coloured of all; *P. Mrs. J. H. Wilson,* and many others. *P. hirsuta* and its varieties are among the easiest of the species in this subsection to cultivate, and they may be grown either in the rocks or on the level. They are granitic plants, and do best when jammed between two pieces of rock.

The characters of the different species in this subsection are so slightly different in many cases that I am inclined to think they should be regarded as only geographical varieties of a single species.

SUBSECTION 5: RHOPSIDIUM, SCHOTT.

Rhopsidium, Schott, Sippen, Oesterr. Primeln (1851), 13.—Sect. Longibracteatæ, Widmer, Europ. Art. Primul. (1891), 143.

KEY TO THE SPECIES.

A. Scape evolute, leaves equal or superior. Robust.

(*a*) Leaves subglaucescent, dark, entire or toothed. *P. Kitaibeliana.*

(*b*) Leaves green, shining, always entire. *P. integrifolia.*

B. Scape very short, leaves shorter, dwarf.

(*a*) Bracts succulent, linear or lanceolate. *P. tyrolensis.*

(*b*) Bracts scaly, broadly ovate. *P. Allionii.*

The plants of this subsection are devoid of farina, the bracts are long, the leaves covered with glandular hairs and colourless exudation.

PRIMULA KITAIBELIANA, SCHOTT.

BIBLIOGRAPHY AND SYNONYMY. — *P. Kitaibeliana*, Schott, in Oesterr. bot. Wochenbl., II. (1852), 268; Walpers, Annal, V. (1858), 466; Reichb., Icon. Fl. Germ., XVII. (1855), 43, t. 66, f. I., II.; Pax, in Engler's Bot. Jahrb., X. (1889), 226; Beck, in Ann. Hofmus. Wien., II. (1887), 126; Widmer, Europ. Art. Primul. (1891), 65; Rossi, in Magyar bot. Lapok., III. (1904), 115.—*P. viscosa*, Waldst. et Kit., Pl. rar. hung., II. (1805), XXVIII. —*P. integrifolia*, Vis., Fl. Dalmat., II. (1847), 149; Pancic, Nova Elem. Fl. Princ. Bulg. (1886), 36.

DESCRIPTION.—Leaves 4 to 8 cm. long, 1 to 3 cm. broad, slightly yellow, intensely odorous, elliptical or oblong, lanceolate, gradually narrowing off into a long petiole, acute or obtuse, generally entire, densely covered with colourless glands, sticky. Bracts herbaceous, linear. Scape glandular, shorter than the leaves, 2 to 7 cm. long, bearing

PRIMULA HIRSUTA VAR. NIVEA, SIMS.

(Nivalis of gardens.

PRIMULA JURIBELLA, SÜNDERMANN.

See page 140.

PRIMULA KITAIBELIANA, SCHOTT.

PRIMULA INTEGRIFOLIA, LINN.

an umbel of from one to two flowers; pedicels 4 mm. long. Calyx glandular, 8 to 12 mm. long, cut nearly to the middle with reddish, ovate or oblong lobes. The corolla is rose or lilac, with a white tube, the limb being from 2 to 2·5 cm. in diameter, the throat glabrous, and the lobes obcordate and emarginate. Capsule 4 to 6 mm. long, enclosed in the calyx.

This Primula is found in the Illyrian Alps and other parts of the Balkan peninsula, on broken rocks and rubble in limestone. Although but little known to cultivation, it is a plant quite easy to grow, and when planted in the rockery in half shade does remarkably well.

P. Kitaibeliana flowers in April and May.

Primula integrifolia, Linn.

Bibliography and Synonymy.—*P. integrifolia*, Linn., Spec. pl., ed. 1 (1753), 144 *ex parte;* Lehm., Monogr. Primul. (1817), 73; Koch, Synops. Fl. Germ., ed. 1 (1837), 590; ed. 2 (1846), 696; Duby, in D C. Prodr., VIII. (1844), 40 *ex parte;* Godron et Grenier, Fl. France, II. (1852), 452; Caruel, in Parlatore, Fl. Ital., VIII. (1889), 645; Pax, in Engler's Bot. Jahrb., X. (1889), 225; Widmer, Europ. Art. Primul. (1891), 66.—*P. incisa*, Lam., Fl. Franc., II. (1778), 250.—*P. Candolleana*, Reichb., Iconogr. Bot., XVI. (1828), 18, f. 802, 803; Fl. Germ. Excurs. (1830), 403; Reichb., Icon. Fl. Germ., XVII. (1855), 49, t. 58.—*Aretia integrifolia*, Link, Handb., II. (1829), 412 ?

Description.—Leaves 1 to 3·5 cm. long, 0·5 to 1 cm. broad, green, shining, without membraneous margin, only slightly sticky, ciliated, with a few small glands on the upper surface, entire, elliptical or oblong in shape, almost sessile, obtuse or subacute. Scape 2 to 5 cm. high,

glandular, carrying generally an umbel of from one to three flowers, but sometimes more; bracts herbaceous, often reddish, linear or lanceolate, obtuse or acute, 5 to 11 mm. long; pedicels short, 0 to 2 mm. long. Calyx reddish, 6 to 9 mm. long, glandular, not cut to the middle, tubular or tubular-campanulate, with obtuse, ovate or oblong lobes. Corolla rose lilac, rarely white. Limb of corolla broadly funnel-shaped, 1·8 to 2·5 cm. in diameter. Capsule 5 to 6 mm. long.

P. integrifolia, which comes from the Pyrenees and the Middle Alps, grows naturally in the Alpine meadows on chalky and schist subsoils.

The flowers, which appear in April and May, are carried erect at the summit of a reddish-coloured scape.

Primula tyrolensis, Schott.

Bibliography and Synonymy.—*P. tyrolensis*, Schott, Sippen, Oesterr. Primeln (1851), 13; Reichb., Icon. Fl. Germ., XVII. (1855), 44, t. 60, f. III., t. 67, f. VI.-VII.; Pax, in Engler's Bot. Jahrb., X. (1889), 230; Caruel, in Parl., Fl. Italian, VIII. (1889), 639; Widmer, Europ. Art. Primul. (1891), 64.—*P. Allionii*, Hausmann, Fl. Tyrol., I. (1854), 719; Koch, Synops. Fl. Germ., ed. 2 (1846), 697.

Description.—Leaves from 1 to 3 cm. long, 1 to 5 cm. broad; bright green, slightly glossy, glandular, and giving an unpleasant odour when pressed; rounded or broadly obovate, passing abruptly into a very short, thin petiole; apex rounded, finely toothed or almost entire. Scape practically sessile or very short, only 0·5 to 2 cm. long, glandular, carrying an umbel of one or two flowers; bracts herbaceous, linear or lanceolate, 3 to 9 mm. long; pedicels very short, 1 to 2 mm. long. Calyx glandular, 5 to 7 mm. long,

divided to the middle, bell-shaped, with ovate lobes, dilated towards the apex, obtuse. The corolla is lilac rose, or rose with a white eye; the limb 1·5 to 2·5 cm. in diameter. The capsules, which do not rise above the calyx, are from 3 to 4 mm. long.

P. tyrolensis is a native of a very small district of the Austrian Tyrol, where it only occurs on the rocks and stony expanses of the Dolomite Alps. Here it is limited to a range of from 1,000 to 2,300 metres, except for a few spare appearances near this.

It is a much easier plant to grow than P. Allionii, and, unlike P. integrifolia, it is fairly easy to flower in this country. It should, however, be cultivated in rockwork, and appreciates a moderately sunny chink or crevice in the rockwork. It may be grown also in loam, peat, and sand in an open position with some stones about it.

This Primula resembles P. Allionii in many ways, but there are various points of divergence which serve to distinguish them. The leaves of P. tyrolensis are a more vivid green, and have not the intense sticky feeling which is so marked in those of P. Allionii; moreover, the leaves of P. tyrolensis on being pressed emit a strong, unpleasant, goat-like odour, which is not perceptible in those of P. Allionii.

The inflorescence is also different in the two plants: the umbel in P. tyrolensis bears one or at most two flowers, while in the other there are sometimes as many as seven.

P. tyrolensis lends itself readily to cross-fertilisation. It has formed hybrids with P. Auricula, P. Wulfeniana, and with P. minima. With the latter it has produced the pretty little P. × Juribella, and with P. Wulfeniana the beautiful P. × Venzoi. P. tyrolensis flowers in April.

Primula Allionii, Lois.

Bibliography and Synonymy.—*P. Allionii*, Loiseleur, in Desv. Journ. de Bot., II. (1809), 262, t. 11, f. 1; Lehm., Monogr. Primul. (1817), 83; Duby, in D C. Prodr., VIII. (1844), 38; Reichb., Icon. Fl. Germ., XVII. (1855), 52, t. 60; Pax, in Engler's Bot. Jahrb., X. (1889), 230; Parl., Fl. Italian, VIII. (1889), 639; Widmer, Europ. Art. Primul. (1891), 62.—*P. glutinosa*, All., Auct. Fl. Pedem. (1789), 6, ex Ind. Kew., III., 625.

Description.—Rhizome lengthened, bearing the dead leaves of former years. Leaves 1 to 4·5 cm. long, 0·5 to 1 cm. broad; thick, ashy green, rather oily, intensely sticky, and thickly covered with colourless glands; margin not membraneous, rounded or oblong or oblong-cuneate on narrowish petioles, obtuse, entire or toothed. Scape almost absent, bearing from one to seven flowers. Bracts scaly, 2 mm. long, ovate, obtuse; pedicels 2 to 4 mm. long. Calyx glandular, 4 to 6 mm. long, divided to the middle; lobes ovate, acute or obtuse. Corolla rose pink, with white eye to faint flesh. The throat is white or yellowish-white. Limb 15 to 20 mm. across, with emarginate lobes. Capsules 3 to 5 mm. long, less than or equal to the calyx.

This very interesting Primula is indigenous to the region of the Maritime Alps between Cunea and Nice, where it is found at a height of from 700 to 1,900 metres in cracks and crevices of hard limestone rocks. It is also discovered in shallow caves which are sunless, and there not a drop of rain can fall on the plants, although the roots must have an ample supply of water from the moisture which soaks through the rocks It is almost needless to say that such conditions can

PRIMULA ALLIONII, LOISELEUR.

PRIMULA MINIMA, LINN.

PRIMULA COTTIA, WIDMER.

See page 106.

PRIMULA LINDSAYI.

See page 128

hardly be secured in our climate, but if certain precautions are taken P. Allionii will prove quite satisfactory and flower well. It should be planted in a crevice in the rockery in a large piece of soft tufa in a perpendicular position beneath an overhanging piece of rock to protect it from direct sun and rain. It may also be placed in gritty, calcareous loam, and it is not difficult of cultivation either there or in a small cave facing west. P. Allionii has been successfully established in the cliff garden in some places in England. Difficult as this plant is to cultivate in the open, these difficulties are largely minimised or disappear entirely when the plants are cultivated in pots in peaty soil with a good deal of sand added. It may be added that a few cultivators in this country assert that they have no difficulty with it, even when exposed to sun and rain, if planted in a crevice of calcareous rock in the cliff. This is not, however, the general experience. The mode of inflorescence is somewhat unique. The flower scape, which is so short as to be almost imperceptible, carries on its summit an umbel of from four to seven large flowers, which open in succession one or two at a time, lying flat in a cushion of leaves, and appear in March and April. Cuttings root readily, so there should be no difficulty in raising a stock if required. The flowering period is March and April.

SUBSECTION 6: CYANOPSIS, SCHOTT.

Cyanopsis, Schott, Sippen, Oesterr. Primeln (1851), 14.

Key to the Species.

A. Leaves serrulate. *P. glutinosa.*
B. Leaves entire. *P. deorum.*

Primula glutinosa, Wulfen.

Bibliography and Synonymy.—*P. glutinosa*, Wulfen., in Jacq., Fl. Austr., V. (1778), 41 app., t. 26; Lehmann, Monogr. Primul. (1817), 69; Koch, Synops. Fl. Germ., ed. 1 (1837), 590; Duby, in D C. Prodr., VIII. (1844), 40; Reichb., Icon. Fl. Germ., XVII. (1855), 46, t. 60, f. IV.-VI.; Caruel, in Parl., Fl. Ital., VIII. (1889), 646; Pax, in Engler's Bot. Jahrb., X. (1889), 230; Widmer, Europ. Art. Primul. (1891), 76.—*P. glutinosa* var. *exilis*, Brügger, in Reichb., Icon. Fl. Germ., XVII. (1855), 46, t. 67, f. I.-II.; Pax, *l.c.*—*Aretia glutinosa*, Link, Handb., II. (1829), 413.

Description.—Leaves 2 to 6 cm. long, 0·3 to 7 cm. broad, lanceolate, wedge-shaped or oblong-lanceolate, stiff, almost erect, smoothish, deep glossy green, with viscid glands, dotted above, margined from the middle upwards, with a short petiole, obtuse, toothed from the middle, rarely subentire. Scape rising above the leaves, about 7 cm. high, with from one to six flowers; bracts broad, imbricated, often of a purplish-brown hue, broadly ovate, obtuse, 7 to 11 mm. long; pedicels almost absent, but when in fruit about 2 mm. long. Calyx glandular, 5 to 8 mm. long, with ovate and obtuse lobes, cut to the middle. Corolla fragrant, violet blue, occasionally with a white tube, equal to or occasionally larger than the calyx, and very deeply cleft. Limb 12 to 18 mm. in diameter.

P. glutinosa is a native of the Central and Tyrolese Alps, and ranges through the Austrian Alps from the Western Rhætian Mountains. It occurs on the granitic formations, and is found in high elevations (2,000 to 2,800 metres) in damp, peaty soil, frequently when the

grassy places are just free from the snow. In cultivation it is a very difficult plant to induce to bloom. It grows well enough in the moraine or on the rockery, but frequently fails to flower. It has been suggested that it should be treated as a bog plant, but those who have tried this plan have no better fortune than others.

P. glutinosa is a much appreciated plant in its native habitats, but as a garden Primula for the open air it has but little to commend it. Could it be successfully managed, it would be much prized, as the intense violet blue colour of its flowers is uncommon in the genus.

For many years I shared the ill-success of the great botanist Clusius, but during the past two or three years I have been able to flower several plants, and these few in pots, using a compost consisting chiefly of peat with the addition of a little pulverised turf and sand. P. glutinosa flowers in May.

Primula deorum, Velenovsky.

Bibliography and Synonymy.—*P. deorum*, Velenovsky, in Vestnik. Kral. cesk. spolecn. nauk. (1890), 55; Fl. Bulgar. (1891), 479; Suppl. (1898), 242; Widmer, Europ. Art. Primul. (1891), 77; Masters, in Gard. Chron., XXXVII. (1905), 93, f. 44.

Description.—Leaves about 0·5 to 0·8 cm. wide and 2·5 to 4 cm. long, rather leathery, stiff, margined with membrane, dotted on the upper surface, set with sessile glands, oblong or lanceolate, entire, acute, with or without a petiole. The reddish-brown viscid scape rising above the leaves to a height of from 6 to 10 cm., and carrying on a unilateral semi-nodding umbel from five to ten rich purple flowers; bracts 3 to 7 mm. long, linear

oblong; pedicels 2 to 5 mm. long. Calyx viscid, deep green, 3 to 4 mm. long, cleft to the middle with narrow, acute, triangular lobes. The corolla is of an intense purple violet. Tube 10 to 12 mm. long. Limb funnel-shaped, 12 to 15 mm. across.

Few hardy Primulas have given rise to more disappointments than P. deorum. Even those who found it apparently easy to grow in their first attempts have seen reason to modify their views, while the appearance of the flowers will hardly justify the early praises they received or the name of Primula deorum—the Primrose of the gods—which has been applied to it. Probably some place where its roots could have access to running water would produce better results. Like P. glutinosa, it flowers best when treated as a pot plant, the compost consisting largely of peat.

Primula deorum comes from the mountains of Bulgaria, and is found close to the snow-fed rivulets and bogs of the higher Balkans, where it is recorded at a height of 2,700 metres. It was first discovered by Velenovsky in 1890, and was introduced to cultivation about 1904. P. deorum flowers in May.

SUBSECTION 7: CHAMÆCALLIS, SCHOTT.

Chamæcallis, Schott, Sippen, Oesterr. Primeln (1851).

Primula minima, L.

Bibliography and Synonymy.—*P. minima*, Linn., Spec. pl., ed. 1 (1753), 143; Schmidt, Fl. Boem., II. (1793), 46, t. 171; Lehm., Monogr. Primul. (1817), 85; Reichb., Iconogr. Bot., VI. (1828), 17, f. 792-800; Koch, Synops. Fl. Germ., ed. 1 (1837), 590; Duby, in D C.

Prodr., VIII. (1844), 39; Reichb., Icon. Fl. Germ., XVII. (1855), 45, t. 59, f. I.-II.; Pynaert., in Fl. Serres, XV. (1862–65), 131, t. 1514; Boiss., Fl. Orient., IV. (1879), 31; Fiek., Fl. Schlesien (1881), 367; Simonkai, Enum. Fl. Transsylv. (1886), 460; Caruel, in Parl., Fl. Ital., VIII. (1889), 646; Pax, in Engler's Bot. Jahrb., X. (1889), 231; Sagorski u. Schneider, Fl. Centralkarp. (1891), 382; Velenovsky, Fl. Bulg. (1891), 479; Widmer, Europ. Art. Primul. (1891), 74; Beck, Fl. Niederoesterr. (1893), 918; Pax, in Wanderer Riesengeb., X. (1904), 85.—*P. Sauteri*, Schultz, in Flora, XIX. (1836), 123.—*Aretia minima*, Link, Handb., II. (1829), 413.—*Kablikia minima*, Opiz, in Berchth., Fl. Boem., II. (1838), 216.

Description.—Leaves from 0·5 to 3 cm. long, 0·3 to 0·8 cm. broad, glossy, stiff, without a cartilaginous margin, nearly glabrous, wedge-shaped or bluntly triangular in form, abruptly truncate and serrated at the apex. The scape is very short, less in length than the leaves as a rule, and only rarely longer, and bears from one to two flowers on extremely short pedicels. Bracts one to three, small, 4 to 8 mm. long. The flowers have a rose-pink corolla, occasionally white, with the limb from 1·6 to 3 cm. across, and with a white throat, and the lobes are cleft. The calyx is 6 to 9 mm. long, divided to less than half its length, with obtuse or mucronate lobes.

P. minima is very widely spread on the high moorlands from the Alps of Central and South Austria through Servia and Bulgaria to Thrace. It is found on both limestone and granite, and is exceedingly plentiful in many of its native habitats.

This plant is well named *minima*, as it is quite a miniature in its growth. It is by no means easy to cultivate, especially as it seems to dislike being in a

bare spot. It does best when it is mingled with other carpeting plants, such as some of the smaller Gentians. Grass is, as a rule, too coarse and chokes it up in this country. It likes a cool, sandy, peaty loam.

Where it thrives, *P. minima* is a gem with its wonderfully large flowers—they are nearly the size of a shilling—of a bright rosy pink. As a pot plant, when plunged in sand in a position facing north it flourishes and flowers well.

Varieties.

F. minima caulescens, Wimmer et Grab., Fl. Siles., I. (1827), 173.—This variety has rose flowers, and has the scape about twice the length of the leaves.

F. minima alba.—The white-flowered variety.

F. minima fimbriata.—A variety with a fringed and deeply incised corolla.

F. minima subacaulis, Wimm. et Grab., Fl. Siles., I. (1827), 173.—Var. *biflora*, Opiz, in Berchth., Fl. Boem., II. (1838), 217.—With shorter scape and leaves.

P. × MARVEN.

CHAPTER VII

LIST OF EUROPEAN HYBRID PRIMULAS.—SECTION AURICULA.

Subsection Euauricula × Subsection Brevibracteatæ.

P. Auricula × P. carniolica = P. × venusta, Host.

P. × venusta × P. marginata = P. × Marven.

Subsection Euauricula × Subsection Rhopsidium.

P. Auricula × P. integrifolia = *P.* × Escheri, Brügger.

Subsection Euauricula × Subsection Erythrodrosum.

P. Auricula × P. œnensis = P. × discolor, Leybold (Portæ, Huter; œnensis var. Judicariæ, Widmer).

P. Auricula × P. hirsuta = P. × pubescens, Jacq. (P. × helvetica, Donn. × alba, Hoffmsg.; × rhætica, Gand. × alpina, Schleicher; × intermedia, Van Houtte; × Goblii, Kerner × Arctotis, Kerner; × Kerneri, Göbl. and Stein; × Peyritschii, Stein).

P. hirsuta × border Auricula = P. × Lindsayi.

Subsection Brevibracteatæ × Subsection Erythrodrosum.

P. hirsuta × P. viscosa = P. Berninæ, Kerner (Salisii, Brügger).

P. viscosa × P. œnensis = P. × Kolbiana, Widmer.

P. viscosa × P. pedemontana = P. × Bowlesii, Farrer.

Subsection Erythrodrosum × Subsection Rhopsidium.

P. hirsuta × P. integrifolia = P. × Heerii, Brügger (P. assimilis, davosiana, Laggeri, Thomasiana, Sündermann, globulariæfolia, incerta, montafoniensis, Trisannæ, Gusmus, and P. integrifolia var. gavarnensis, Widmer).

Subsection Brevibracteatæ × Subsection Rhopsidium.

P. integrifolia × P. viscosa = P. × Dinyana, Lagger (P. Murctiana, Moritzi, Mureti, Charpentier).

Subsection Arthritica × Subsection Erythrodrosum.

P. glaucescens × P. hirsuta, a doubtful hybrid said to have been found on the Val d'Ambro.

Subsection Arthritica × Subsection Rhopsidium.

P. tyrolensis × P. Wulfeniana = P. × Venzoi, Huter (P. × venzoides, Huter; adulteriana, cridalensis, micrantha, valmenona, Gusmus).

Subsection Arthritica × Subsection Chamæcallis.

P. Clusiana × P. minima = P. × intermedia, Portenschlag (P. Floerkeana, Salzer; Portenschlagii, Beck; Wettsteinii, Wieamnn; fallax, monticolo, spinulosa, Gusmus).

P. minima × P. Wulfeniana (P. Deschmanni, Kankeriana, mutata, Gusmus) = var. *a*, P. × serratifolia (Gusmus), Widmer; var. *b*, P. × vochinensis (Gusmus), Widmer.

P. minima × P. spectabilis (P. fratensis, Fumana, Valbonæ, varians, Gusmus) = var. *a*, Dumoulini, Stein; var. *b*, Facchini (Schott), Pax.

P. × FORSTERI, STEIN.

Subsection Erythrodrosum× Subsection Chamæcallis.

P. minima ×P. villosa (P. flatnitzensis, Laxii, variformis, Gusmus)=var. *a*, P. ×Sturii (Schott), Widmer; var. *b*, P. ×truncata (Lehm.), Widmer.

P. minima ×P. œnensis (P. coronata, Porta)=var *a*, P. ×pumila, Kerner; var. *b*, P. ×Widmeræ, Pax.

P. hirsuta ×P. minima (P. brennia, diversa, venalensis, pseudoforsteri, Gusmus)=var. *a*, P. ×Forsteri, Stein; var. *b*, P. ×Steinii, Obrist; var. *c*, P. ×Kellereri, Widmer.

Subsection Chamæcallis× Subsection Rhopsidium.

P. minima ×P. tyrolensis=P. ×Juribella, Sündermann.

Subsection Chamæcallis× Subsection Cyanopsis.

P. glutinosa ×P. minima=var. *a*, P. ×Huteri, Kern; var. *b*, P. ×Floerkeana, Schrad.; var. *c*, P. ×Salisburgensis, Floerke.; var. *d*, P. ×biflora, Huteri.

Subsection Erythrodrosum× Subsection Erythrodrosum.

P. hirsuta ×P. œnensis=P. œnensis ×P. viscosa, Widmer, Europ. Art. Prim. (1891), 97=P. Seriana, Widmer. This plant is intermediate between the parents. As it is of no value for cultivation it need not be further discussed.

Subsection Arthritica× Subsection Arthritica.

P. glaucescens subsp. longobarda ×P. spectabilis, Widmer, Europ. Art. Primul. (1891), 107=P. Carueli, Porta, in Widmer—*i.e.*, nearly intermediate between the parents, but has narrower leaves than P. specta-

bilis, much attenuated, and with fewer pellucid dots. It differs from P. glaucescens in having pellucid dots; a shorter calyx, and longer pedicels. Said by Porta to be found on the Bergamasker Alps, near Brescia, at a height of 2,000 to 2,400 metres.

Hybrid Primulas of Auricula Section, but Uncertain or Doubtful.

P. admontensis, Gusmus, in Kolb. Alpenfl. (1890), 231. —*P. integrifolia*, Lehm., Monogr. Primul. (1817), t. 8.— *P. Clusiana*, Reichb., Icon. Fl. Germ., XVII. (1855), t, 58, f. I.—*P. Churchilli*, Gusmus, in Kolb. Alpenfl. (1890), 236.—*P. Clusiana* var. *crenigera*, Beck, Fl. Niederoesterr. (1893), 918.—*P. Clusiana* var. *admontensis*, Widmer, Europ. Art. Primul. (1891), 92.

Leaves denticulate from the middle, otherwise agreeing with *P. Clusiana*.

P. Auricula × *viscosa*, hardly to be met with among the parents. See *P. Auricula* × *hirsuta*.

P. Auriculoides, Gusmus, in Möller's Deutsch. Gartn. Zeitg., XVIII. (1903), 181. Said to be the same as *P. Auricula* × *Wulfeniana*. *P. glaucescens* × *integrifolia* is *P. intermedia* of Hegetschw. et Heer. *P. glutinosa* × *integrifolia*, Widmer, Europ. Art. Primul. (1891).

P. Lebleana, Gusmus, in Kolb. Alpenfl. (1890), 246.— *P. Auricula* × *Wulfeniana*, Widmer, Europ. Art. Primul. (1891), 92.

P. Paxii, Gusmus, Pl. Alpin., I. (1905), 22. Said to be the same as *P. minima* × *viscosa*.

P. ventricosa, Gusmus, Fl. Alpin., I. (1905), 23.

SUBSECTION EUAURICULA× SUBSECTION BREVIBRACTEATÆ.

P. × VENUSTA, HOST. = P. AURICULA × CARNIOLICA, PAX.

BIBLIOGRAPHY AND SYNONYMY.—*P. Auricula* × *P. carniolica*, Pax, in Engler's Bot. Jahrb., X. (1889), 225; Widmer, Europ. Art. Primul. (1891), 80; Derganc, in Acta Horti. Jurj., II.-III. (1901), 153 ex Bot. Centralbl., XCIII. (1903), 494.—*P. venusta*, Host., Fl. Austr., I. (1827), 248; Reichb., Iconogr. Bot., VII. (1829), 13, t. 630; Lindl., Bot. Reg. (1837), t. 1983; Koch, Synops. Fl. Germ., ed. 1 (1837), 589; Reichb., Iconogr. Fl. Germ., XVII. (1855), 37, t. 53, f. I.; Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 80; Caruel, in Parl., Fl. Ital., VIII. (1889), 629.—*P. Jelenkœ*, Gusmus, et *P. idriana*, Gusmus, in Möller's Deutsch. Gartnerzeit., XVIII. (1903), 190.

DESCRIPTION.—Leaves more or less farinose, but sometimes this is quite absent, and varying in appearance, though generally closely resembling those of P. carniolica, while the calyx is also more or less farinose. The flowers, two to sixteen in number, are purplish, red purple, or a brownish-rose. It comes from the Idrian ranges, and was in cultivation in Vienna Botanic Garden in 1833.

Its general appearance is like that of a purplish Auricula. It is not at all difficult to cultivate in sandy peat with the addition of some pulverised turf. A half-shaded position is recommended.

Primula × Marven is a beautiful garden cross between P. × venusta and P. marginata. The flowers are in colour a fine dark violet with a white farinose eye. The whole plant is farinose. It is of good constitution, and flowers freely in April.

P. Auricula × integrifolia=P. Escheri, Brügger.

Bibliography and Synonymy. —*P. Auricula* × *integrifolia*, Pax, in Engler's Bot. Jahrb., X. (1889), 225; Widmer, Europ. Art. Primul. (1891), 90.—*P. Escheri*, Brügger, in Jahresb. naturf. Gesellsch. Graubundt., XXIII.-XXIV. (1880), 100.

Very little is known about this plant, but it was collected by Sündermann, and twice flowered in the Botanical Gardens at Munich. Professor Brügger also cultivated it at Chur. Sündermann's specimens showed characteristics half-way between the parents. Those of Brügger inclined more towards the Auricula.

It is found on the West Rhætian Alps.

P. Auricula × P. œnensis, Pax.=P. Portæ, Huter.

Bibliography and Synonymy. —*P. Auricula* × *P. œnensis*, Pax, in Engler's Bot. Jahrb , X. (1889), 228; Widmer, Europ. Art. Primul. (1891), 87.—*P. Auricula* × *villosa*, Leybold, in Oesterr. bot. Wochenbl., IV. (1854), 9.—*P. discolor*, Leybold, in Flora, XXXVIII. (1855), 344, t. XI. (sphalm. X.); Reichb., Icon. Fl. Germ., XVII. (1855), 38, t. 55, f. I.-II.; Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 81; Caruel, in Parl., Fl. Ital., VIII. (1889), 638.—*P. Portœ*, Huter ex Kerner, in Oesterr. bot. Zeitsch., XXV. (1875), 81; in Sched. ad Fl. Austr. Hung., IV. (1886), 53.—*P. œnensis* var. *Judicariœ*, Widmer, Europ. Art. Prim. (1891), 49, 141.

Description.—This hybrid is exceedingly variable, and as seeds are freely produced and the seedlings vary, some coming near one of the original parents and some nearer the other, they are difficult to identify. The recognised original hybrid differs from *P. Auricula*

P. × VENUSTA (ROSE).

in having reddish glands, shorter pedicels, and the flowers violet or yellowish-white; and from *P. œnensis* by having the foliage frequently entire, and by its longer pedicels. The seedlings give an almost endless variety, differentiated from the following hybrid derived from *P. Auricula* × *hirsuta* by having rufous glands on the leaves. The latter are often narrower than those of *P.* × *pubescens*. The flower scape equals or is longer than the leaves, and carries a few or many-flowered umbel of flowers. The leaves are obovate or oblong wedge-shaped, entire or slightly denticulate, and with or without a cartilaginous margin.

It is found in the Alps of the Southern Judicaria in limestone, but is far from plentiful as a natural hybrid. It is not difficult to cultivate in limestone or other rocks.

P. Auricula × P. hirsuta, Pax. = P. pubescens, Jacq.

Bibliography and Synonymy.—*P. Auricula* × *P. hirsuta*, Pax, in Engler's Bot. Jahrb., X. (1889), 227.—*P. pubescens*, Jacq., Misc. Austr., I. (1778), 159, t. 18, f. 2; Reichb., Iconogr. Bot., IX. (1821), 16, f. 1139; Reichb., Icon. Fl. Germ., XVII. (1855), 41, t. 68; Caruel, in Parl., Fl. Ital., VIII. (1889), 630.—*P. helvetica*, Donn, in Loddiges, Bot. Cab., t. 348; Reichb., Icon. Bot., IX. (1821), 16, f. 1138; Reichb., Icon. Fl. Germ., XVII. (1855), 38, t. 65, f. I.—*P. alba*, Hoffmsg., Verz. Pfl.-Kult., 2 u. 3, Nachtr. (1826), 185 ?—*P. rhœtica*, Gaud., Fl. Helvet., II. (1828), 91; Koch, Synops., ed. 2 (1846), 694; Reichb., Icon. Fl. Germ., XVII. (1855), 37, t. 54, f. I.—*P. alpina*, Schleicher, in Reichb., Icon. Bot., IX. (1821), 11, f. 1124; Kerner, in Oesterr. bot. Zeitschr., XXV. (1875),

125.—*P. Auricula* var. *nigra*, Lemaire, in Fl. des Serres, IV. (1848), 405.—*P. Auricula* var. Scheidweiler, in Fl. des Serres, VII. (1851–52), 263, t. 740.—*P. Auricula* var. *mollis*, Reichb., Icon. Fl. Germ., XVII. (1855), 37, t. 52, f. III.—*P. intermedia*, Van Houtte, in Fl. des Serres, XVIII. (1869–70), 73, t. 1869.—*P. Goblii*, Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 82 (sphalm., *P. Goebelii*).—*P. Arctotis*, Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 124.—*P. Kerneri*, Gobl. et Stein, in Oesterr. bot. Zeitschr., XXVIII. (1878), 188.—*P. Peyritschii*, Stein, in Samenkat. bot. Gart. Breslau, 1881.—*P. Auricula* × *villosa*, Pax, in Engler's Bot. Jahrb., X. (1889), 228; Widmer, Europ. Art. Primul. (1891), 89.—*P. Auricula* × *viscosa*, Pax, in Engler's Bot. Jahrb., X. (1889), 229; Widmer, Europ. Art. Primul. (1891), 83.—*P. Auricula* × *latifolia*, Widmer, Europ. Art. Primul. (1891), 81.

Description.—*P. Auricula* × *P. hirsuta* or *pubescens* is one of the plants which are almost the despair of the botanist and student of the genus Primula. It is exceedingly varied in the natural habitats where it is found, along with its parents, and it is still more so in cultivation. For very many years this hybrid has been cultivated and has been seeded, the seedlings fertilised by other varieties and with the original parents, so that they have assumed almost protean forms. It is to this hybrid that many believe we owe most of our present-day Auriculas, besides many other hybrid Primulas which are broadly grouped under the name of pubescens.

P. hirsuta × Border Auricula = P. × Lindsayi.

Description.—A strong-growing and vigorous plant, throwing up stout stems carrying large compact tresses of deep magenta-coloured flowers. This garden hybrid

was raised some years ago by the late Mr. Lindsay, Edinburgh.

The illustration gives a good idea of the general appearance of P. × Lindsayi, which flowers in April.

SUBSECTION BREVIBRACTEATÆ × SUBSECTION ERYTHRODROSUM.

P. HIRSUTA × P. VISCOSA, PAX. = P. BERNINÆ, KERNER.

BIBLIOGRAPHY AND SYNONYMY.—*P. hirsuta* × *viscosa*, Pax, in Engler's Bot. Jahrb., X. (1889), 228.—*P. graveolens* × *viscosa*, Christ, in Flora, XLVIII. (1865), 213.—*P. Berninæ*, Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 153.—*P. Salisii*, Brügger, in Jahresb. naturf. Gesellsch. Graubundt., XXIII.-XXIV. (1880), 100.—*P. latifolia* × *viscosa*, Widmer, Europ. Art. Primul. (1891), 93.

DESCRIPTION. — This handsome Primula, very frequently called by Kerner's name of *P. Berninæ* in gardens, is intermediate between its parents, but comes nearer *P. viscosa* than *P. hirsuta*. The flowers are fewer, larger, and wider than those of the latter, but they have the purplish and powdered throat of *P. viscosa*. It is smaller in its habit than the latter. The leaves are rather resinous in smell, are rounded or oblong lanceolate, having a narrowed petiole, densely glandulose, with yellow or uncoloured glands. The scape is equal to or longer than the leaves, and carries an erect or sometimes a unilateral umbel of semi-nodding flowers. The corolla tube is whitish or purplish, the throat is slightly glandular, the limb narrowly or broadly funnel-shaped, violet, purple, or lilac rose. It occurs with its parents in the Bernina.

Chain and the Bergamask Alps. It grows in free, open soil, and is very handsome with its fine purple, lilac-throated flowers.

P. PEDEMONTANA × VISCOSA, FARRER= P. BOWLESII, FARRER.

BIBLIOGRAPHY.—*P. Bowlesii*, Farrer, in Journ. Royal Hort. Soc., XXXIX. (1913), I., 123-227; Farrer, in Gard. Chron. (1911), 201.

DESCRIPTION.—A recently discovered hybrid found by Mr. E. A. Bowles and Mr. Reginald Farrer on the lesser Mont Cenis. It is rather like P. hirsuta × viscosa or Berninæ. It is intermediate between its parents, but shows the traces of the greater influence of P. pedemontana. The leaves have less of the russet coating on the margin than P. viscosa, and it has wider flowers than that species, and the flowers are of a warmer purple. The scape is longer than that of P. pedemontana.

SUBSECTION ERYTHRODROSUM × SUBSECTION RHOPSIDIUM.

PRIMULA × HEERII, BRÜGGER=P. HIRSUTA × P. INTEGRIFOLIA.

BIBLIOGRAPHY AND SYNONYMY.—*P. hirsuta* × *integrifolia*, in Engler's Bot. Jahrb., X. (1889), 226.—*P. Heerii*, Brügger, in Jahresber. naturf. Ges. Graubundt., XXII.-XXIV. (1880), 100.—*P. integrifolia* × *viscosa*, Widmer, Europ. Art. Primul. (1891), 98.—*P. integrifolia* var. *gavarnensis*, Widmer, Europ. Art. Primul. (1891), 98.—*P. assimilis*, *P. davosiana*, *P. Laggeri*, *P. Thomasiana*, Sündermann, *l.c.*, 100.—*P. globulariæfolia*, *P. incerta*, *P. montafoniensis*, and *P. Trisannæ*, Gusmus, in Möller's Gartner Zietg., XVIII. (1903), 194.

PRIMULA HEERII, BRÜGER.

PRIMULA KELLERERI, WIDMER.

See page 140.

STAGE AURICULA (GREY EDGE), "GEORGE RUDD."

Description.—A beautiful, reputedly sterile hybrid, with leaves which are rather shining or translucent and light green, either entire, slightly toothed or toothed, elliptic or obovate, on a narrowed petiole and hairy. The scape equals or exceeds the leaves; the bracts are linear-lanceolate, and are from 3 to 8 mm. in length; pedicels 1 to 9 mm. long. The calyx is purplish, and 4 to 9 mm. long, with obtuse lobes. The corolla is bright rose lilac or dull rose, with a coloured or whitish tube and a glandular throat, the limb being from 15 to 25 mm. in diameter, broadly funnel-shaped or flat, with the lobes emarginate. It differs from *P. integrifolia* in having the leaves frequently denticulate and in its longer pedicels, and from *P. hirsuta* in its longer bracts, shorter pedicels, larger flowers, and by the throat and tube of the corolla being frequently coloured. It is found in the West Rhætian Alps and in the Pyrenees.

SUBSECTION BREVIBRACTEATÆ × SUBSECTION RHOPSIDIUM.

Primula × Dinyana, Lagger= P. integrifolia × viscosa.

Bibliography and Synonymy.—*P. integrifolia* × *viscosa*, Pax, in Engler's Bot. Jahrb., X. (1889), 229.—*P. Dinyana*, Lagger, in Flora, XXII. (1839), 670; Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 155.—*P. Muretiana*, Moritzi, Pfl. Graubundt. (1839), 111, t. 2; Reichb., Icon. Fl. Germ., XVII. (1855), 42, t. 60, f. I., t. 67, f. III.-V.; Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 155.—*P. Mureti*, Charpentier ex Koch, Synops. Fl. Germ., ed. 2 (1846), 697.—*P. Candolleana* × *graveolens*, Brügger ex Reichb., Icon. Fl. Germ., XVII. (1855), 42.—*P. integrifolia* × *latifolia*, Widmer, Europ. Art. Primul. (1891), 95.

Description.—A sterile hybrid with red-violet flowers, and intermediate between its parents. The leaves are sticky, frequently partially lucent, oblong wedge-shaped, seldom oblong-ovate or ovate, blunt, generally entire or with the apex denticulate, pilose and glandular. Scape 1 to 10 cm. high, carrying an erect or nodding umbel of from one to seven flowers; bracts green or scaly, lanceolate or ovate, 2 to 9 mm. long; pedicels short, 1 to 6 mm. long. Calyx 4 to 9 mm. in length, often purplish, with obtuse lobes. Corolla deep red or red violet, with bluish throat with short glands farinose, limb 1·5 to 2·5 cm. in diameter, funnel-shaped, with emarginate lobes. It differs from *P. integrifolia* in the foliage being often denticulate and in the umbel being many-flowered and frequently nodding, the pedicels being longer; the throat of the corolla being partly farinose, but not hairy. It differs from its other parent, P. viscosa, by having fewer but larger flowers, longer bracts, a greater-sized calyx, and a smaller capsule.

This hybrid produces seed capsules, but, as already stated, the seeds are sterile.

If you have a large number of hybrids, it is interesting to arrange them according to their degree of likeness to the different parent stocks. Two such examples have been arranged by Brügger and Reichenbach where the flowers and calyx of the one resemble P. integrifolia, the hairs and root-stock resemble P. latifolia, whereas in the other case the matter is reversed. There are also hybrids which keep a middle course between the two parents, but the majority generally resemble one more than the other.

It is fairly common in the Bernina Chain, but is not plentiful in gardens, though not difficult to cultivate in open loamy soil. It blooms in April and May.

P. × VENZOI, HUTE.

SUBSECTION ARTHRITICA × SUBSECTION RHOPSIDIUM.

P. TYROLENSIS × WULFENIANA, PAX = PRIMULA × VENZOI, HUTER.

BIBLIOGRAPHY AND SYNONYMY.—*P. tyrolensis* × *Wulfeniana*, Pax, in Engler's Bot. Jahrb., X. (1889), 230; Widmer, Europ. Art. Prim. (1891), 105.—*P. Venzoi*, Huter ex Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 155.—*P. venzoides*, Huter ex Kerner, *l.c.;* Caruel, in Parl., Fl. Ital., VIII. (1889), 642.—*P. adulteriana*, Gusmus, *P. cridalensis*, Gusmus, *P. micrantha*, Gusmus, *P. valmenona*, Gusmus, in Möller's Gartn. Zeitg., XVIII. (1903), 191.

DESCRIPTION.—This plant is not uncommon in gardens, where its rosy lilac flowers are pleasing and the whole appearance of the plant good. The leaves are rather stiff, shining, or dull green, more or less glaucous, usually entire or toothed, subelliptic or obovate, with a narrow or barely visible cartilaginous margin, glabrous or glandular. The flower scape is from 1 to 3 cm. in length, with the bracts narrowly lanceolate in form. The calyx is often purplish, and has obtuse lobes, and is about 1 cm. long. The rosy lilac flowers are borne two or three in an umbel, and the corolla is about 2 cm. in diameter. It is taller than *P. tyrolensis*, from which it differs also in having the foliage almost entire and in the calyx being frequently purplish. It differs from *P. Wulfeniana* in the latter possessing stiff, larger, and very glaucous, smooth, entire, and broadly margined leaves.

This hybrid, which flowers in April, comes from the Venetian Alps, and is found at an altitude of from 1,900 to 2,200 metres.

SUBSECTION ARTHRITICA × SUBSECTION CHAMÆCALLIS.

P. CLUSIANA × P. MINIMA, SCHOTT = PRIMULA × INTERMEDIA, PORTENSCHLAG.

BIBLIOGRAPHY AND SYNONYMY. — *P. Clusiana* × *P. minima*, Schott, Wild. Blendl. Oesterr. Prim. (1852), 18; Neilreich, Fl. Niederoesterr. (1859), 587; Pax, in Engler's Bot. Jahrb., X. (1885), 232; Widmer, Europ. Art. Prim. (1891), 108; Beck, Fl. Niederoesterr. (1893), 918; Derganc, in Allegm. bot. Zeitschr., X. (1904), 78.—*P. intermedia*, Portenschlag, in Tratt. Arch., IV. (1814), t. 436; Schott, Wild. Blendl. Oesterr. Prim. (1852), 10, t. II.; Reichb., Icon. Fl. Germ., XVII. (1855), 45, t. 65, f. II.; Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 156.—*P. Floerkeana*, Salzer, in Verh. zool. bot. Ver. Wien., I. (1852), 165.—*P. integrifolia* × *minima*, Neilreich, in Verh. zool. bot. Ver. Wien., I. (1852), 126.—*P. Portenschlagii*, Beck, Fl. Hernstein (1884), 375, t. VIII., f. 2.—*P. Wettsteinii*, Wiemann, in Bot. Centralbl., XXVIII. (1886), 347; in Zool. bot. Ges. Wien., XXXVI. (1886), 376.—*Primulas fallax*, *monticola*, and *spinulosa* of Gusmus, in Möller's Deutsch. Gartn. Zeitg., XVIII. (1903), 175.

DESCRIPTION. — This is a charming little hybrid Primula, with leaves which are from 1 to 2·5 cm. in length, and are ovate, wedge-shaped or oblong-lanceolate, blunt or sharp, with the lower margin dentate, narrowly edged with a cartilaginous margin and densely supplied with glandular hairs. The scape, which carries from one to three of its large blush flowers, is equal or taller than the leaves. It is said to be sterile, but this is doubtful.

P. intermedia occurs in the limestone rocks of the Viennese Alps.

P. MINIMA × P. WULFENIANA, WIDMER = P. × DESCHMANNI, GUSMUS.

BIBLIOGRAPHY AND SYNONYMY.—*P. minima* × *Wulfeniana*, Widmer, Europ. Art. Prim. (1891), 109.—*P. Deschmanni*, *P. Kankeriana*, and *P. mutata*, Gusmus, in Möller's Deutsch. Gartn. Zeitg., XVIII. (1903), 175.

DESCRIPTION. — A sterile hybrid resembling both parents, but differing from *P. Wulfeniana* by the leaves being saw-toothed, and from *P. minima* in its larger habit.

The variety *serratifolia* (Gusmus), Widmer = P. serrata, Widmer, has oblong-lanceolate or oblong-cuneate leaves, with from seven to nine teeth; it has very short pedicels, and is without a scape.

The variety *vochinensis* has oblong leaves, seldom entire, and often with from one to three teeth. The scape is very short—rarely 1 cm. Both these varieties are from Carinthia.

P. MINIMA × P. SPECTABILIS, PAX.

BIBLIOGRAPHY AND SYNONYMY.—*P. minima* × *P. spectabilis*, Pax, in Engler's Bot. Jahrb., X. (1889), 232; Widmer, Europ. Art. Prim. (1891), 109.—*P. fratensis*, *P. Fumana*, *P. Valbonæ*, and *P. varians*, Gusmus, in Möller's Deutsch. Gartn. Zeitg., XVIII. (1903), 175.

DESCRIPTION.—A sterile hybrid, small in habit and having rather obovate leaves, with saw teeth and margined with stiff membrane, glabrous and slightly viscid. The scape, which is often very short, bears from one to two flowers. It differs from *P. minima* in its more robust habit and in having margined leaves, and from *P. spectabilis* in being dentate and with dots in the foliage, besides being dwarfer.

The variety *Dumoulini* (Stein), Widmer, Europ. Art. Primul. (1891), 110.—*P. Dumoulini*, Stein, Samenkat. bot. Gart. Breslau (1881). It is a little plant, with short, one-flowered scape, and wedge-shaped, serrately-toothed, and slightly truncate at the end. This is close to *P. minima*. It comes from the Alps of Judicaria.

The variety *Facchini* (Schott), *P. Facchini* of Schott, Wild. Blendl. Oesterr. Prim. (1852), 8, t. III.; Reichb., Icon. Fl. Germ., XVII. (1855), 45, t. 59, f. IV.; *P. Floerkeana*, Facchini, Fl. Südtyrol. in Zeitschr. Ferdinandeum 3, Folge V. (1856), 19, is *P. magiassonica* of Porta; *P. minima* and *spectabilis* var. *magiassonica* of Widmer; *P. macciassonica*, Dalla Torre et Sarnh., and *P. spectabilis* var. *Facchini* of Caruel. It is taller, and has ovate rhomboid leaves toothed from the middle, and bears two large-sized flowers. Southern Judicarian Alps.

SUBSECTION ERYTHRODROSUM × SUBSECTION CHAMÆCALLIS.

P. MINIMA × VILLOSA, REICHB.

BIBLIOGRAPHY AND SYNONYMY.—*P. minima* × *villosa*, Reichb., Icon. Fl. Germ., XVIII. (1855), 46; Pax, in Engler's Bot. Jahrb., X. (1889), 232; Widmer, Europ. Art. Prim. (1891), 104.—*Primulas flatnitzensis, Laxii*, and *variiformis* of Gusmus, in Möller's Deutsch. Gärtn. Zeitg., XVIII. (1903), 175.

DESCRIPTION.—This is sterile hybrid, practically intermediate between its parents. It may be distinguished from *P. villosa* by its scape being less in length than the leaves and by the almost colourless glands, and from *P. minima* in having several flowers on the scape, its almost opaque and glandular leaves.

There are two varieties. These are:

1. Var. ×Sturii of Schott, Widmer, Europ. Art. Prim. (1891), 104.—*P. Sturii*, Schott, in Verh. zool. bot. Ges. Wien., III. (1853), 302, and of Kerner and Kolb. The leaves are broadly wedge-shaped, rounded at the apex, and with eight or ten teeth, slightly scattered with reddish or colourless glands. The four- to five-flowered scape is shorter than the leaves. The pedicels are about 5 mm. in length, and the calyx about 7 mm. The outside of the tube of the corolla is ruddy with glands, and the throat has long hairs inside.

A native of Styria, and in cultivation generally under the name of P. Steinii.

2. Var. ×truncata of Lehm., Widmer, Europ. Art. Prim. (1891), 104.—*P. truncata*, Lehm., Monogr. Prim. (1817), 87, t. 8; Reichb. and Kolb.—*P. Jiraseckiana*, Tratt. ex Reichb., Fl. Germ. Excurs. (1830), 402.—*Aretia truncata* of Link. The leaves are wedge-shaped, with about five, six, or seven teeth at the rounded truncate end, and with short, uncoloured glands scattered along the edge. The two-flowered scape is shorter than the leaves. The flowers are nearly sessile. The calyx is from 6 to 9 mm. long, and the tube of the corolla is sprinkled with very small uncoloured glands. Styria.

P. minima ×P. œnensis, Pax.

Bibliography and Synonymy.—*P. minima* ×*œnensis*, Pax, in Engler's Bot. Jahrb., X. (1889), 232; Widmer Europ. Art. Primul. (1891), 103.—*P. coronata*, Porta ex Kolb., Alpenfl. (1890), 237.

Description.—This is a sterile hybrid of which there are two recognised varieties, but it is very variable, and

there are many forms. The typical plant, or what is described as such, is very near *P. minima*, but has two to four flowers on the scape, a shorter calyx, and glandular leaves. The calyx is longer than that of *P. œnensis*, the height is often less, and the leaves are not sticky as in that species.

Var. ×pumila (of Kerner), Widmer, Europ. Art. Prim. (1891), 103. Has much the habit of *P. minima*, and has a scape carrying two flowers and as long as the leaves. The latter are cuneate, roundly obtuse at the end, and with from six to nine horny-pointed teeth on each leaf set regularly. The pedicels are about 2 mm. long, and the bracts are linear. The calyx is 6 mm. long. The corolla measures about 18 mm. across.

A native of the Judicarian Alps, where it is found in the Alpine grasslands.

Var. ×Widmeræ, Pax. This varicty is taller than the preceding, and has obovate leaves with eight to ten small teeth which are minus the horny points of the variety pumila. The glands are yellowish or reddish. The scape, which carries as many as four flowers, is equal to or longer than the leaves. The bracts are linear lanceolate; the pedicels 2 to 3 mm. long. The calyx is 5 mm. in length, and the corolla nearly 2 cm. in diameter. The throat has small glands densely covered with red.

This is found with the variety ×*pumila*, together with intermediate varieties. It seems unfortunate that these two have been distinguished by separate names.

P. hirsuta ×P. minima, Pax.

Bibliography and Synonymy.—*P. hirsuta* ×*minima*, Pax, in Engler's Bot. Jahrb., X. (1889), 232.—*P. minima* ×*viscosa*, Widmer, Europ. Art. Prim. (1891),

101.—*P. brennia, diversa,* and *venalensis,* Gusmus, in Möller's Deutsch. Gartn. Zeitg., XVIII. (1903), 175.—*P. pseudoforsteri,* Gusmus, Pl. Alpin., I. (1905), 23.

Description.—This is a very handsome plant in its various forms, which are very numerous and almost bewildering in their way. According to Widmer the plant is sterile, but this is an error. Hence in all probability the multiplicity of forms, which tax the discernment of the student of the Primulas.

Var. ×Forsteri (Stein), Widmer, Europ. Art. Prim. (1891), 102.—*P. Forsteri,* Stein, in Gartenfl., XXVIII. (1879), 322; in Samenkat. bot. Gartn. Breslau (1881).

The glandular leaves, which are wedge-shaped, and are roundly obtuse at the tip, toothed with from eight to thirteen horny points, not sticky, and with short glands. The scape, which carries from one to three flowers, is short; the bracts fleshy; the pedicels from 3 to 4 mm. long. The calyx is about 7 mm. in length. The corolla measures about 25 mm. across, and the throat has many long villous hairs. Coming near P. minima, it has, however, glandular leaves, which are rounded at the tip. This is one of the most beautiful Primulas in cultivation. It is easily grown in peaty soil, and when seen at its best the flowers practically smother the plant with its wealth of bloom. It flowers in April.

Var. ×Steinii (Obrist), Widmer, Europ. Art. Prim. (1891), 102.—*P. Steinii,* Obrist ex Stein, in Gartenfl., XXVIII. (1879), 322, t. 991, f. 1-3.

The leaves of this lovely Primula are spoon-shaped or oblong spoon-shaped, toothed from the middle with from seven to ten horny-pointed teeth, and glandular, though rather lucent, and only slightly viscid. The scape bears

from two to five large flowers. The bracts are fleshy, and the pedicels are about 5 mm. in length. The corolla, which is about 22 mm. across, has a villous throat.

Var. × Kellereri, Widmer, Europ. Art. Primul. (1891), 102.

This form differs mainly from *P. hirsuta*, which it much resembles, by the short glands and in the small leaves being armed with horny-pointed teeth, and by its longer bracts. The leaves are viscid, are densely glandular, opaque, ovate-cuneate, with the apex obtuse and closely toothed from the middle with horny-tipped teeth. The scape bears from three to six large brilliant crimson flowers; the bracts are lanceolate; the pedicels from 5 to 8 mm. in length. The corolla is from 2 to 2·5 cm. in diameter, with the throat clad with very short glands.

All the varieties of this hybrid occur on the Brenner Alps.

SUBSECTION CHAMÆCALLIS × SUBSECTION RHOPSIDIUM.

P. minima × tyrolensis, Widmer = Primula × Juribella, Sündermann.

Bibliography. —*P. minima* × *tyrolensis*, Widmer, Europ. Art. Primul. (1891), 106.—*P. Juribella*, Sündermann, in Oesterr. bot. Zeitschr., XXXIX. (1889), 156; Kolb., Alpenpfl. (1890), 245.

Description.—This is a lovely and uncommon little Primula with cuneate, sparsely glandular leaves, rather lucent and slightly sticky, roundly truncate from the middle, toothed with teeth which are cartilaginously tipped. All the plants I have grown have only carried one flower, but it is stated that sometimes two are borne. Bracts small, pedicels very short. P. Juribella differs from *P. tyrolensis* very slightly, and from *P. minima* in

P. × MURETIANA, MORITZI.

having finer leaves, which are of rather a dull hue of green—a feature produced by the numerous glands. In nature it is confined to the fine, close, grassy mountain slopes of the Giurbella Alps.

SUBSECTION CHAMÆCALLIS× SUBSECTION CYANOPSIS.

P. GLUTINOSA × P. MINIMA.

BIBLIOGRAPHY AND SYNONYMY.—*P. glutinosa* × *minima*, Pax, in Engler's Bot. Jahrb., X. (1889), 240; Widmer, Europ. Art. Primul. (1891), 111.—*Aretia Floerkeana*, Link, Handb., II. (1829), 413.

DESCRIPTION.—A fertile, very variable hybrid which gives many varieties almost impossible to separate and extremely puzzling to differentiate. Pax and others have selected four for varietal names, but these and others merge into each other. These varieties are:

VAR. × HUTERI (Kern.), Pax, in Engler's Bot. Jahrb., X. (1889), 234.—*P. Huteri*, Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 159.

Leaves oblong-spathulate, toothed towards the top with from eleven to fifteen short, hard-pointed teeth. Bracts two to three. Calyx rather shorter. Scape sticky. Corolla violet, limb shorter than the tube. Comes close to P. glutinosa.

VAR. × FLOERKEANA (Schrad.), Pax, in Engler's Bot. Jahrb., X. (1889), 231.—*P. Floerkeana*, Schrad., in Kruenitz. Oekon. Encycl., CXVII. (1811), 393; Lehm., Monogr. Primul. (1817), 81, t. 8, etc.—*P. minina* var. *hybrida*, Reichb., Icon. Bot. Germ., VI. (1828), f. 800-801.—*P. puberula*, Schott, Wild. Blendfl. Oesterr. Prim. (1852), 10, t. 2 ?—*P. permixta*, Gusmus, in Möller's Deutsch. Gartnr. Zeitg., XVII. (1903), 175 ?

Leaves spathulate, with from nine to fifteen strong, triangular, horny teeth. Bracts oblong. Calyx short. Scape glutinous, bearing from one to four bright red-violet or mauve-red flowers.

Var. × Salisburgensis (Floerke), Pax, in Engler's Bot. Jahrb., X. (1889), 231.—*P. salisburgensis*, Floerke, in Sched.; Schott, Wilde Blendl. Oesterr. Prim. (1852), 8, t. 1; Kerner, in Oesterr. bot. Zeitschr., XXV. (1875), 158. —*P. Floerkeana*, Reichb., Icon. Fl. Germ., XVII. (1855), t. 59, f. VI. ?

Leaves wedge-shaped, with seven to nine strong teeth towards the end. Scape not glutinous; bracts oblong, shorter than the calyces, limb of tube longer. The flower buds are deepish blue, and when open lavender with creamy white eye, and the plant more or less approaches *P. minima*, except in colour of the blooms, which come near those of *P. glutinosa*. Unlike P. glutinosa, P. × salisburgensis does well on the rockery, and flowers freely.

Var. × biflora (Huter), Pax, in Engler's Bot. Jahrb., X. (1889), 230.—*P. biflora*, Huter, in Oesterr. bot. Zeitschr., XXV. (1875), 158.

This very rare hybrid variety approaches very nearly to *P. minima*, from which it mainly differs in having two flowers on a short scape. These are large and of a bright pink or rose. The leaves are cuneate-obovate, truncated at the end, and having five to seven strong sharp teeth towards the apex. The scape is non-glutinous, the bracts, which are oblong, number two to three, and are shorter than the calyces.

The above hybrids, with many others which merge closely in them, occur on granite moors in the Brenner Alps, the Southern Dolomites, Mongoni-Thal, and other parts where the two parents are found near each other.

CHAPTER VIII

THE HISTORY OF THE AURICULA

Kerner's History of the Auricula—Alpine Auriculas—Border Auriculas—Double Auriculas—The Auricula in Cultivation—Improvement of the Auricula—The Cultivation of the Auricula—Frames or Houses for the Auricula.

Kerner's History of the Auricula.

The history of the garden Auricula has been the subject of a great amount of discussion, and much has been written about it. The Primula Conference of the Royal Horticultural Society, held at South Kensington on April 20 and 21, 1886, was the means of providing much valuable material in the elucidation of the question. Kerner's article, which was the foundation of the discussion at the conference, appeared in the sixth volume of the *Zeitschrift der Deutschen* and *Oesterreichischen Alpenvereins*, Munich, 1875. It was afterwards published at Innsbruck as a separate pamphlet. For the following summary of the pamphlet we are indebted to the survey of the subject in the *Gardeners' Chronicle* by Mr. Churchill. We venture to give this in full, as it presents a concise and most important review of the evidence on which Kerner founded his argument.

"1. About the year 1570 the Emperor Maximilian II. possessed a large garden in the neighbourhood of Vienna, which Clusius frequently refers to, containing a great

number of species to which both Italy and the eastern Mediterranean supplied a rich contingent.

"2. A passion for gardening had seized upon the noble Viennese ladies and others of that period; and the peasantry used to bring down to the Viennese markets for sale specimens of many kinds of Alpines—among others, Primula Auricula, L., P. Clusiana, Tausch., and P. farinosa, L.

"3. The Belgian L'Ecluse (Clusius), who was the greatest botanist of his day, was in 1573 invited by the Emperor to Vienna, and received the honorary title of Court Botanist.

"4. In his Vienna garden Clusius had a special portion devoted to Alpines, and cultivated as many as fifty species, with the object of making them permanent ornaments of a garden.

"5. He had a special preference for the Alpine Primulas.

"6. Others, such as Professor Aichholz, in Vienna, who in 1576 made excursions in Styria; Camerarius, of Nuremberg, in the Alps of Salzburg and Tyrol; and Schlick, of Kaufbeuren, in the Rhætian Alps, brought down, like Clusius, for cultivation numerous Alpines.

"7. When Clusius left Vienna to settle in Frankfurt-on-the-Main, he commenced a most active correspondence with Viennese and other ladies, noblemen, landowners, priests, apothecaries, and others, upon botanical matters; and in this way was continually receiving both living and dried specimens of Styrian, Carinthian, Salzburg, Tyrol, Bavarian, Swiss, and Venetian Alpines, as well as plants from Belgium, England, Spain, Italy, Hungary, Crete, and Constantinople.

"8. Clusius bewails the difficulty he meets with in

'taming' these Alpine Primulæ; and especially laments his want of success with the 'blauen speik' (P. glutinosa). Two only—P. Auricula, Linnæus, and P. pubescens, Jacquin—responded to his efforts to cultivate them.

"9. Of the latter Primula, which he calls Auricula Ursi II., he says that he saw it first in the garden of his friend Professor Aichholz in Vienna, who had received it from a noble lady, but did not know whence she obtained it. He had sought for it in vain in the Austrian (Archduchy) and Styrian Alps; but later learnt from his friend that it was found in the Alps near Innsbruck."

(In confirmation of this Mr. Churchill intercalated the next paragraph.)

"10. In Amthor's 'Alpenfreund,' Vol. X., p. 178, it is stated that a certain Countess Trautsmannsdorf, who passed her 'Sommerfrisch' at Schloss Trautson, near Matrei, on the Brenner Pass, sent the P. pubescens to Clusius for his Alpine garden.

"11. About 1582 Clusius sent from Vienna to his friend Van der Dilft specimens of P. Auricula and P. pubescens.

"12. Their cultivation spread so rapidly that they appeared in most gardens in Belgium, Germany, England, and Holland by the middle of the seventeenth century; and in the year 1664 several cultivated varieties of P. pubescens of different colours were known. They were also tried in Italy, but without success.

"13. P. Auricula, not yielding varieties, gradually disappeared from cultivation, while the other increased until more than a thousand forms were in cultivation.

"14. After Clusius' time the knowledge of the original habitat of P. pubescens gradually faded away.

"15. But between 1774 and 1794 the P. pubescens

was again found by Wulfen, not on the Alps near Innsbruck, but in the peasants' gardens at Windisch-Matrei. The peasants, on being interrogated by Wulfen as to its origin, would probably reply that they came from the neighbouring mountains. Wulfen, however, never saw any wild specimens, but sent specimens of the cultivated plant to Jacquin at Vienna, who gave it its present name.

"16. Since then, although the Iselthal Mountains from Windisch-Matrei to Pregraten, and all the neighbouring Alps, have been by later botanists most diligently searched, no wild specimen has ever been found.

"17. Not only in the gardens near to Windisch-Matrei, however, was it grown, but also in many of the valleys of the Pusterthal, and also in North Tyrol in the Innthal.

"18. In the year 1867, however, Kerner, who was accustomed to spend his summer holidays in the Geschnitzthal, discovered the P. pubescens (superauricula × hirsuta, All.) growing with its two parents, and another hybrid (subauricula × hirsuta, All.), P. arctotis, in the upper end of the valley in the neighbourhood of the Tribulaun, a dolomite peak.

"19. Kerner adds that, so far as he knows, the Auricula (through P. pubescens) is the only Alpine plant that has become a generally cultivated florists' flower."

Kerner's opinion, which he supports by the preceding history and evidence, is that the garden Auricula was derived from P. Auricula and P. hirsuta, whose union, he considered, produced P. pubescens, which was the parent of the garden Auricula. He also believes that P. Auricula is not subject to variations, and that it (the type) did not probably maintain a footing in gardens after the middle of the seventeenth century. He, how-

ever, derives both the florists' or stage Auricula and the Alpine Auricula from P. pubescens.

Mr. Shirley Hibberd's paper at the first Primula Conference discussed Kerner's opinion, but that keen florist did not accept the ideas of the Continental botanist. He was of the opinion that "the proposal (Kerner's) will not be accepted by many of the raisers of seedlings, whose experiences have rendered them familiar with the peculiarities of both classes. It affords but poor promise of an explanation of the persistency of the yellow colour and the farinose decoration of the show flowers. Nor does it satisfactorily explain the shaded margin and the persistently naked leaf of the Alpine section. As regards the yellow of the show flower, it does not appear in its true proportions to the casual eye; but if you will carefully wash away the paste, you will find that it is laid upon a yellow ground."

Mr. Hibberd's own idea was that the general agreement of the Alpine Auriculas was with P. commutata (P. commutata of Schott, P. villosa var. commutata, Pax) and P. pedemontana, and he remarked upon the great evidence of the last named which was apparent in the Alpine Auricula. He also considered that P. ciliata, Moretti (P. Auricula var. ciliata, Pax), might be concerned with P. Auricula as having a part in the origin of the florists' or show varieties.

Mr. Shirley Hibberd in his paper gave the views of several others who had given their opinions. Among others he cited those of Charles Darwin, who ("Forms of Flowers," p. 43) derives the florists' Auricula from P. pubescens, which he supposes to be a hybrid between P. Auricula and P. hirsuta. This is, of course, in general agreement with Kerner.

Dean Herbert, a most careful observer and student, on the other hand, considers that P. Auricula, P. helvetica P. Auricula × P. hirsuta, Pax), P. nivalis (of Donn? P. Auricula var. ciliata of Pax), and P. viscosa had all an influence in the genesis of the florists' Auricula ("Horticultural Transactions," vol. iv., p. 19). Herbert's suggestion may not be far from the point, as at least three of these are now comprised in P. Auricula and its varieties, as recognised by leading authorities.

At the same conference Mr. J. G. Baker restated his theory of the origin of the Auricula, and we cannot do better than give a short extract from his statement. He said: "My theory is that the great mass of these garden Auriculas originated from the wild species, Primula Auricula, which is widely spread in Switzerland and Austria and throughout all the Alps of Europe, and from its varieties or hybrids, Balbisii, venusta, and Goeblii. . . . The characteristic of all the forms of this Primula Auricula (the Linnæan type) is an amount of meal upon the leaves, spreading up the leaves, the stalks, and the peduncles, and extending to the calyx. The variety Balbisii differs from the type Auricula (it still keeps its yellow flower) in its more hairy and more toothed leaves. Then there is a third plant which has been supposed to be a hybrid, but may be a mere variety of Primula Auricula—namely, Primula venusta. . . . It is in reality one of the plants we ought to look to, because it has a purple flower, and I think it is extremely likely that it is from this that the purple colour of many of the garden Auriculas has come. But the plant which most nearly matches the common garden Auriculas is Kerner's Primula Goeblii. It is said to be a wild type. Primula Goeblii may be a hybrid or it may be a variety of

Primula Auricula, but I find no difficulty in supposing the mass of garden Auriculas have come from this, from venusta, from Balbisii, and from typical Primula Auricula."

Mr. Baker proceeded: "What cultivators call the Alpine Auricula I believe to be substantially Primula pubescens, which is a plant that Kerner writes about. The way in which I differ from Kerner is that, instead of supposing this Primula pubescens to be the parent of all the garden Auriculas, I consider that Goeblii, venusta, Balbisii, and typical Primula Auricula, are the ancestors of the common garden Auricula, and pubescens the progenitor only of what gardeners call the Alpine Auricula."

We have quoted at length from Mr. Hibberd and Mr. Baker, as the question is an important one which is well worthy of close consideration.

It may be remarked with reference to the respective theories which have been recapitulated above that in many of the seedlings of P. pubescens, as well as in what are reputed to be hybrids, there is a marked resemblance to the Alpine Auriculas. The florists' Auricula, as will be seen from the following pages, has come down practically unchanged for many years, while the other Auriculas have shown great variation.

Alpine Auriculas.

The present advanced stage of perfection to which the flower has been brought, and, in fact, the origin of the section as a florists' flower, may be said to be due to the work of the late Mr. Charles Turner, of Slough, the then proprietor of the nurseries still carried on under the same name. Mr. John Ball is understood to have been

in charge of these flowers, and to have been the skilled raiser of so many beautiful Alpine Auriculas.

The points of the Alpine Auricula are different from those of the show varieties, but should be retained, as these flowers are superior in everything but broad effect to the Border Auricula. The points of the Alpine Auricula may well be ascertained by applying to them the " Judging Rules " of the Royal Horticultural Society, which assign 6 points to a perfect flower. These are: A well-formed flat pip, 2 points; tube filled with the anthers, 1 point; centre yellow, cream, or white, destitute of farina, 1 point; the edge a zone of some dark colour shaded to a paler tint, 2 points.

A high authority on the Auricula formulated his views in the following words: " These very beautiful flowers possess, as features of distinction from the edged classes and selfs, a perfectly unmealed centre or eye, and petals richly shaded from the deepest to the lightest tints of that one colour which this flower has adopted. That shading cannot be in tints too numerous or too softly blended." The mouth of the tube ought to be well defined, and rise fully to the level of the flower's face. There are two classes, the one having a pale, almost Primrose-yellow centre, and the other having this of a golden yellow, the latter being preferred. It is observed that the flowers which have blue or bluish flowers are the lightest in the yellow of the tube and eye.

The cultivation of the Alpine Auriculas is easy enough, as they are quite hardy and can be planted and grown in the open air. They are so much improved by being treated in the same manner and with the same compost as the show Auriculas that they are generally cultivated in pots. For growing in this way the methods of cultiva-

tion recommended for the show or stage Auriculas may be followed, and the beauty of the flowers will well repay the cultivator for the trouble involved. If a simpler method is desired and better flowers are wished than from plants grown in the border and uncovered by glass, a bed of the soil suggested for the show varieties can be made up, and the plants put in there and covered with a frame. The after-attention required is practically the same as for the show Auriculas, but they are less exacting and do not suffer so quickly from the neglect of little attentions. In the open border these Alpine Auriculas are very delightful flowers, although less effective at a distance than the Border Auriculas.

Border Auriculas.

The term "Border Auricula" may be said to include all the flowers which do not come within the definition of a show or Alpine Auricula. It must not be concluded, however, that the name "Border Auricula" practically covers all the inferior flowers properly belonging to the Alpines. The taste for Border Auriculas lies in the direction of robust-growing plants with large trusses and pips and effective colouring. Form is of some consideration, and well-defined colouring counts for a good deal. This race of Auriculas has been vastly improved within recent years, and some of the flowers to be seen at the present day are charming and often brilliant garden plants. They require good treatment to grow them well, and they should be divided annually, or at latest every two years, to secure the best flowers. The best time to perform division is just after flowering. These Border Auriculas delight in good compost, and that for the show varieties is not too good for them.

It may be mentioned here that Auriculas with variegated leaves occasionally occur, and that several plants of this kind were exhibited in Edinburgh about twenty years ago.

Double Auriculas.

Like many other flowers of the genus, the Auricula has produced varieties with double flowers. These are much prized by the comparatively small number who cultivate them, but they are scarce, and some are expensive to purchase where they are obtainable at all.

Perhaps the earliest mention of a double Auricula occurs in Rea's "Flora" of 1665, where that old writer (p. 153) says, under the heading of "Auricula floreluteo," after speaking of raising "Leather-Coats": "And there is one that on a short stalk beareth four or five double flowers, with three rows of leaves in each flower." This is probably the first double yellow Auricula of which we have any record.

There are now in cultivation a fair number of double Auriculas. Among these there is the rare old Double Yellow, a great beauty in its way, and much to be commended to those who admire such plants. The Double Green is an interesting flower. The Double Blue is attractive. A handsome dark-coloured one called Double Dark Crimson is prized by its owners, though, like the Double Blue, it is very rare.

Then there is one named Double Lavender, of the pleasing shade indicated by the name. A charming Double Grey Auricula also exists, and finds a considerable number of admirers.

To the strait-laced florist devoted to the stage Auricula these double flowers are monstrosities, but they are

STAGE AURICULA (PALE YELLOW SELF), "MAY-DAY."

DOUBLE AURICULA.

interesting flowers all the same. A collection of the above varieties will afford a great deal of pleasure to those who see them.

The Auricula in Cultivation.

It is generally agreed that the wild Primula Auricula was known to the ancient Roman and other writers on the subject of natural history, etc. It is understood that the Auricula was known to Ovid, Pliny, and Columella, but it is to more recent times that we must look for any precise information regarding the flowers. Dioscorides was the source whence many of the earlier authors of herbals derived their information, and quite a number of descriptions and woodcuts were taken from his works.

Perhaps the earliest figure of the wild Primula Auricula which can be accepted as a real figure of the plant is that given in the "New Kreuterbuch" of Matthiolus, which was published in 1563, which is a rather crude but generally faithful illustration. The same writer also figured it in "De Plantis Epitome."

The work of Clusius, "Rariorum Plantarum Historia," Antwerp, Plantin Press, 1601, is usually referred to in connection with the history of the Primula and the Auricula.

In his earlier work, also published at Antwerp by the same press in 1583, Clusius names the following:

Primula vera.
Primula vera flore rubra.
Auricula lutea flora.
Auricula vera rubra flora.
Auricula flore varie.
Auricula ursi carnea colo. fle.
Auricula ursi angustifolia.
Auricula ursi minima.
Auricula ursi minima flore niveo.
Lunaria arthritica.
Paralytica alpina.

The following appear in the work of 1601:

Primula veris vulgaris.
Primula veris rubra fl. pl.
Primula veris alba fl. pl.
Primula veris flava fl. elatior.
Primula veris pallida fl. elatior.

Eight varieties of Auricula are shown, all numbered according to descriptions, practically the same as above.

The Auricula was also mentioned by Fuchsius, who died in 1563, and by Dodoens. In the three editions of the works of the latter's "History of Plants," published respectively in Dutch, French, and English, and in the two last named (edited by Clusius and Lyte respectively), the Auricula is badly figured under the name of Auricula ursi. This appellation was also employed by Matthiolus, and was applied to the plant for many years afterwards, and thence is derived the popular name of "Bear's ear." In the "Stirpium Adversaria Nova" of Lobel and Pena (published in 1605) it is shown that at the beginning of that century, at least, purple, rose, and white Auriculas were in cultivation. A little earlier, however, Clusius (Charles de L'Ecluse), whose "Rariorum Plantarum Historia" was published in 1601, gives in full detail the Primulas of the Austrian and Styrian Alps. No fewer than eight are described, and six of these are well figured. Clusius gives a figure of Primula Auricula as Auricula ursi, and one of Primula pubescens, which he calls Auricula ursi 2. Clusius informs us that he introduced the latter into cultivation, but that the former, P. Auricula, was in cultivation before his time, and has widely spread in Belgian gardens. It is generally understood that the introduction of the Auriculas into the British Isles was due to the artisans and others who fled from the Netherlands during

the troubles of the year 1570, and who brought with them many of their favourite flowers.

Gerard, in 1597, described and figured some half-dozen varieties. As has been pointed out before now by those who have studied the question and compared the figures, Gerard's figure of the true Primula Auricula is an exact copy of that of Matthiolus in 1563, and the other is apparently one of Gerard's own imagination. Johnson's edition of Gerard is also misleading, as the figures there are almost entirely taken from Clusius. It is otherwise with the text; for this edition, published in 1633, gives some particulars regarding the varieties in existence, which are said to have had flowers of white, red, yellow, and purple, with the leaves either green or hoary.

Parkinson, in his "Paradisi in Sole, Paradisus Terrestris," dated 1629, describes twenty varieties of "Auricula ursi, Beares' eares," and depicts several of these. These descriptions and figures, especially the former, give us some idea of the further evolution of the florists' Auricula, as some of these had evidently a "paste" centre, while others were free from it. The description of "Auricula ursi flore tannetto, Tawney Beare's eare," may be partly quoted to show this. It says: ". . . The flowers are many . . . each whereof is of as deepe a murrey or tawnie colour when it is blowne . . . hauing a white circle at the bottome of the flower and yellowish in the middle belowe the circle." The colours described in the different flowers were yellow, purple, maroon, red, violet, and white.

Parkinson says ("Paradisus," p. 240): "Many other varieties are to be found . . . either naturally growing on the mountaines in seuerall places from whence they . . . have been taken and brought, or else raised from the seede of some of them."

In his "Theatre of Plants," published in 1640, Parkinson extends the information respecting these Auriculas, or "Beares' eares," and describes no fewer than twenty-six.

Johnson's "Gerard," published in 1633, does not extend the information given by Parkinson to any great degree, but it is remarked that Tradescant and a Mr. Tuggie both appear as "having their gardens well furnished with the Auriculas."

In 1665 "John Rea, gent," published his "Flora seu De Florum Cultura." This work not only considerably enlarges our information respecting the Auricula, described by Rea as "Auricula ursi," or "Bear's Ears," but also shows how widespread was the interest in the flower, and how great was the number of seedlings which were being raised. It also indicates the names of some of the leading cultivators of the Auricula at that time.

Rea divided the Auriculas into four classes according to colours, and it is interesting to notice that the yellow and white-flowered Auriculas were not much prized, although the buff-coloured varieties were more appreciated than the other yellows. The paste seems to have been highly considered in the different classes, and even among the varieties of the yellow Auricula, which, as Rea informs us, were "of small esteem," those "that bear the largest flowers, the biggest truss, of the deepest yellow colour, and white eyes, are most regarded." The more ordinary ones were thrown away, as Rea tells us. He says, "I have done above fourty in one year that came of seeds." He commends more highly those "of buff colour," some yellower and some dunner than others. These appear to have been called "Leather-Coats," and Rea relates that "every Florist had his Leather-Coat, many of which yet

remain and retain the names of those that raised them, as Tradescant's Leather-Coat, Lance's, Tuggie's, Turner's, Collins', Looker's, Humphries', Meracow's, Mow's, Müllar's, Randall's, and Ricket's Beazar, all several good kinds of Leather-Coats, and I have raised a Leather-Coat myself from seeds." One is curious to know what "Ricket's Beazar" (the last word probably being for bizarre) was like.

It is worth noting that in speaking of the yellow Auricula Rea mentions a double Auricula, which had a short stalk bearing "four or five double flowers with three rows of leaves in each flower." This is, so far as I know, the first record of a double Auricula.

Of the white Auricula this old writer says that it is "of small variety and esteem."

The purple Auricula, "Auricula flore purpureo," is evidently the class which was most appreciated by Rea and other florists of his time. It was "of divers sorts, some deeper and some lighter," and he begins with one which was apparently the favourite; this is "the fair Downham," which was one of the first flowers of its kind of good quality. It was of a "fine bright murrey or reddish-purple colour," of five petals and with "a white circle or eye in the middle." Among the other Auriculas of this class mentioned is "Mr. Good's purple Auricula." It is remarked that these "will not wash yellow with rain." "Misstris Buggs her fine purple" was more erect and of a deeper purple, with "broader white eyes." "Mr. Whitmore's purple" was lighter in colour, and had "fair white eyes." "Purple Fransway" was rich shining purple, and had a very large white eye.

In the following we seem to observe the appreciation of deep-coloured, almost black flowers. The first of these

is "The Black Imperial," which had "many fair flowers close set together, of so dark a purple colour that without much error it may be called black, with snow-white eyes."

Two striped Auriculas are described in this class, one being "the purple striped Auricula," evidently a poor thing, but with purple flowers striped with white. The other was a better plant, and had large lemon-coloured flowers striped with reddish-purple.

In the red or scarlet Auriculas only one is specially mentioned. This was "Mistris Austin's scarlet." Rea mentions also other reds inclining to scarlet, "some redder and some yellower than others, and with white or pale yellow eyes."

What Rea says about the cultivation of these Auriculas is very interesting, but cannot be detailed here. Then, as now, the best sorts were grown in pots. The compost must have been very rich, as the pots had to be "almost half full with sifted Neats'-dung, the rest with good sandy earth well mixed with such sifted dung." Rea also gives detailed instructions regarding the raising from seeds, which was, he said, "a secret wherewith few are well acquainted."

We must, however, part from this true plant lover of the olden time and give a few references to those in later years. A long period seems to have elapsed between the time when the flowers with the "large white eyes" or paste were so highly prized and the evolution, or at least the recognition, of the Auriculas with a distinct edge, although Parkinson speaks of a yellow flower with a purple edge.

Miller, in his "Gardeners' Dictionary" (which was first published in 1731, and afterwards passed through several editions), gives good rules for the standard of an

Auricula, but the edge obtains no recognition. Hill's "British Herbal," published in 1756, supplies no information on the point of edged flowers, and the same author's "Eden" is equally silent in 1757. Hanbury's "Body of Gardening," published in 1770, has often been quoted as affording information about striped and variegated Auriculas, but it is not certain that the edged flowers were then much, if at all, appreciated. A good deal of discussion has taken place on the point, but Mr. Shirley Hibberd assumed that some edged flowers were cultivated in 1750 or previous to that. He quotes Slater's "Amateur Florist's Guide," which gives a list of edged flowers which were cultivated in 1776, and we may take it for granted that this is the first authentic statement regarding the actual existence from the florist's point of view of the edged flowers. Mr. Hibberd says that Pott's Eclipse, Rule, Arbiter, and Hortaine were grown in 1757. A few years later these edged flowers were very numerous, and such varieties, some of them still well known and appreciated, were in the possession of the Auricula fanciers of 1785, as Gorton's Champion, Wrigley's Northern Hero, Grimes's Privateer, and Popplewell's Conqueror, and were greatly admired.

Hughes, in his book called the "Flower Garden," which appeared in 1672, gives brief directions for the cultivation of what had now begun to be called the "Auricula," but perhaps among the earliest works which described the rules for considering the relative properties of the flower was that of James Thompson, a Newcastle florist, who published in 1757 a brochure under the name of "The Distinguishing Properties of a Fine Auricula."

Richard Bradley was still earlier in the field, as he gave seven characteristic points of what constituted a good

Auricula in the eyes of skilled florists in his "New Improvements of Gardening," which appeared in 1718.

Abercrombie repeats Bradley's points in 1778, and they may be quoted here now as illustrative of the taste of the time. "The flower stem should be upright, tall, and strong enough to support its cluster of flowers tolerably upright; the cluster or truss of flowers should be large and regular, somewhat of a roundish form, all the florets being arranged on short pedicels, to form the truss close and regular; the florets should be large, and the top spreading flat and regularly around, and the eye of each floret large, circular, and bright."

In the year 1792 James Maddock issued the first edition of his book, "The Florists' Dictionary: A Treatise on the Culture of Flowers." A new edition (improved by Samuel Curtis) appeared in 1810. Maddock gives full details regarding the culture of the florists' Auricula, but the history he supplies is exceedingly meagre. He says, with evident ignorance of the early cultivators, that "it owes its present improved state principally to the assiduity and attention of English florists to its culture, who have, from the seed of a flower imported from Holland about fifty years since, produced by continued cultivation almost all the varieties we now can boast." He adds the remark that the Dutch and French had only produced little more than yellow, brown, or other shaded sorts greatly inferior to those produced in this country. Maddock, unfortunately, does not name any of the Auriculas of the time, but he gives full details regarding the cultivation, raising from seeds, and the points required. Curtis adds a few remarks, mainly on the question of soils, but disagreeing with Maddock on the question of annual potting, which the latter advocated.

Maddock's compost consisted of:

"One-half rotten cow-dung, two years old. One-sixth fresh sound earth, of an open texture. One-eighth earth of rotten leaves. One-twelfth coarse sea or river sand. One twenty-fourth soft, decayed willow wood (Note—found in the trunks of old willow trees). One twenty-fourth peaty or moory earth. One twenty-fourth ashes of burnt vegetables."

Curtis recommends the following:

"Two-thirds of the rotten dung from old hot-beds reduced to fine mould, one-third containing equal parts of coarse sand and peat or bog earth, such as is used in the cultivation of heaths, mixed well together by sifting or screening, and suffered to be well aired by frequent turning during the frosts of winter. If the dung is so far decayed that the mass seems too adhesive, more sand may be added."

The next writer of importance in the literature of the Auricula was Isaac Emmerton, whose book entitled "A Plain and Practical Treatise on the Culture and Management of the Auricula," etc., was published in London in 1816. A second edition appeared in 1819. Emmerton followed much the same lines as Maddock, and his views were considered and in some cases corrected. George Glenny practically stereotyped the points about the year 1847, though these appear to have been somewhat condensed within recent years. They were as follows:

The Pip.—1. Should be circular, large, with petals equal, firm, fleshy, smooth at the edges, without notch or serrature, and perfectly flat.

2. The centre, or tube, should not exceed one-fourth

of the diameter of the pip; it should be of a fine yellow or lemon colour, perfectly round, well filled with the anthers, or thrum, and the edge rising a trifle above the paste, or eye.

3. The paste, or eye, should be perfectly circular, smooth, and a dense pure white, without crack or blemish, forming a band not less than half the width of the tube and encircling it.

4. The ground colour should be dense, whole, and form a perfect circle next the eye; the brighter, darker, or richer the colour, the better the flower; but if it be paler at the edges of the petals (where they are parted into five) or have two colours or shades, it is a fatal defect.

5. The margin or outward edge should be a clear, unchangeable green, grey, or white; and be about the same width as the ground colour, which must in no part go through to the edge. From the edge of the paste to the outer edge of the flower should be as wide as from the centre of the tube to the outer edge of the paste. In other words, the proportions of the flower may be described by drawing four circles round a given point at equal distances, the first circle forming the tube, the second the white eye, the third the ground colour, and the fourth the outer edge of the flower, and the nearer they approximate to this (except that the ground colour and green or grey edge may run into each other in feathery points) the better the flower. The colours should not be liable to fly.

Of the Plant.—1. The stem should be strong, round, upright, elastic, bearing the truss upright without support, and from 4 to 7 inches high, so as to carry the truss well above the leaves.

2. The length and strength of the foot-stalks of the

pips should be so proportioned to the number and size of these that all the pips may have room to show themselves, and to form a compact, semi-globular truss of flowers, not less than seven in number, without lapping over each other. The pips should be all alike in colour, size, and form, so as not to be easily distinguished from one another; for, otherwise, the unity and harmony of the truss will be destroyed, and, although ever so beautifully formed, would appear as if taken from different sorts of Auricula. An Auricula ought to blow freely, and expand all its pips at the same time; for by this means the colours in them will appear equally fresh and lively; whereas, in those trusses that do not open some of the pips till others have passed their prime, the whole appearance of the truss is impaired.

3. The truss is improved if one or more leaves grow and stand up well behind the blooms; for it assists the truss, and adds much to the beauty of the blooms by forming a green background.

4. The foliage, or grass, should be healthy, well grown, and almost cover the pot.

The Royal Horticultural Society's " Rules for Judging " afford us a simple standard which is good enough for most purposes, and which, when read along with the foregoing, will give the reader a good idea of how to judge his flowers and those of others.

The truss to consist of not less than five fully developed flowers for exhibition purposes. Points 10.

(*a*) The corolla round, smooth on the edge, perfectly flat, 2 points.

(*b*) The tube yellow or lemon, round, filled with the anthers, hiding the stigma from view, 1 point.

(*c*) Paste smooth, solid, pure white, 2 points.
(*d*) Ground colour dense, forming a perfect circle next the paste, 2 points.
(*e*) The edge green, grey-white, or unshaded self-colour, 2 points.
(*f*) The stem strong and sufficiently long to bear the truss above the foliage, 1 point.

The Improvement of the Auricula.

The Auricula has been brought to such perfection as a florists' flower in the many years during which it has been in cultivation that little further improvement appears possible. Yet raisers are constantly endeavouring to add new varieties which will be superior, or at least equal, to the older ones. The standard of perfection in the stage or show Auricula, for example, is so high that it appears impossible to produce anything better than some of the fine flowers which are in existence, yet the Auricula fancier has set before him such a high ideal that he endeavours to raise something even finer. In certain directions, it may be admitted, some improvement may be within reach, but in order to obtain this it is necessary to be careful lest, in striving to gain certain points, others of equal or greater importance are neglected, with the result that the new variety is inferior to the old as a whole, though superior in the details aimed at.

It has been laid down upon the highest authority that in breeding Auriculas form should be the chief essential to be aimed at, as colour can be more easily obtained afterwards. Building up form is, therefore, a special object to be kept in view.

It appears to be generally held by experienced raisers of new Auriculas that the female parent—*i.e.*, the seed

bearer—must have special consideration, and must be the best available flower in flatness, roundness, substance, breadth, and smoothness. The male parent—*i.e.*, the pollen bearer—ought to have these points as far as possible also, so that the desired characteristics may be secured in the seedling.

It has frequently been remarked that each of the two classes of edged and self flowers has its point of weakness in form. In the selfs the defect has always been a notch or heart-shaped indentation in the petal; while in the edged flowers the shortcoming has lain in the petals being too pointed. These features must be kept in view, as it is desirable to eliminate both failings, although in the case of the self flower there has been a kind of condonation of the fault. A great improvement has been apparent with respect to the edged flowers, and there is no reason why the self-coloured Auricula should not attain the same standard.

It has been remarked, with absolute justice, that a self which has a good form has almost invariably also a high character in some of its other points, although this is, of course, not without exception.

A self flower which is perfect, or as perfect as possible in its circular form, has generally a paste of equal perfection. That is, the circle of "paste" is practically perfect, and is not irregular in its outline, as often happens with the notched flowers.

As the selfs are generally lacking in substance as compared with the edged flowers, an endeavour should be made to bring them up to the same standard, but this is not so easy as the tyro would imagine. It has been proved that crossing the selfs with an edged flower does not necessarily mean that a flower with more substance

will be produced. This is evidenced by the fact that seedlings from edged Auriculas often prove to be selfs, and that they are generally thin in substance and badly notched, or without the smoothness which should characterise a good flower.

Improvement in colour is a great object with the selfs, and considerable advances in this direction have been made. The latest developments have been the securing of good crimsons, and also of pinks, though the latter colour is not so " fixed " and enduring as is to be desired.

Authorities agree that the best plants in the edged class are generally raised by crossing edged flowers with others of the same class. This is due to the importance of form, and its corresponding influence on the form of the circle of paste, while there is less likelihood of the loss of the quality of substance. There is a greater probability of securing decided colouring on the edges from using edged Auriculas only for breeding from than by the importation of the element introduced by the self Auriculas.

The number of petals is another consideration in the selection of a variety for retention in choosing from among seedlings. In Glenny's time much stress was laid upon this question. Glenny insisted that six petals were necessary to attain perfection, but others considered that five were sufficient and were less likely to give a frilled or unevenly formed flower. At the present time five appears to be the generally accepted number. It is not, however, a heinous offence for a flower to have more, but five or six may be considered sufficiently good in that respect.

Breeding for body colour, as well as for perfection of the edges and of the paste and tube, will require some

thought. A perfect green, grey, or white edge and well-marked paste are all patent desiderata, so that time need not be spent in discussing these points, although the tendency of the tube to be of a poor, greeny yellow requires guarding against. The body colour, however, requires more notice, and not only its depth, but its arrangement, would call for consideration on the part of the raiser. It must form a good solid band of colouring between the paste and the edge, well defined against the paste, but pencilled into the edge in a handsome and pronounced way, not with little notches or pencillings here and there. The general body colour is, of course, black, of which depth and a pleasing, not harsh, shade is desired. Other colours are to be found among the "body colours," but black has always been most sought after, and is looked upon with greater favour.

It will be readily observed from these remarks on the improvement of the Auricula that the perfect seedling is difficult to obtain, there being so many points to consider. Yet what has been achieved before can be performed again, and the wonderfully beautiful flowers in this section raised even within the past few years by Mr. James Douglas and others show that the mantle of the older florists has fallen upon more than one of the raisers of recent days.

The points of the Alpine Auricula, as will be observed from the "points for judging" of the Royal Horticultural Society, are more easily attained. Yet the tendency has been to find it more and more difficult to produce flowers better than those previously raised, and the pains which require to be taken with Alpine Auriculas will inevitably tend to setting up a still higher standard of beauty.

One point should once more be mentioned for the

benefit of the raiser of seedling Auriculas. This is that they do not always show their permanent character in the first three years of their flowering. Sometimes a flower which on its first flowering promises to be of exceptional merit is vastly inferior in the second season. It may revert to its first season's perfection in the third, or it may remain a disappointment to its raiser.

The Cultivation of the Auricula.

Like all other florists' flowers, the Auricula deserves the most careful cultivation, and to secure the best results no effort should be spared. Few plants, indeed, respond so well to attention to minute details, rewarding the assiduous cultivator by the production of the most perfect flowers.

Propagation is effected by means of offsets or seeds, the former being the only method by which existing varieties can be perpetuated, while by the latter new varieties are raised, although only a small proportion of these will be worth retaining as improvements on existing varieties.

Offsets are the suckers which form on the old roots, and also the young growths which are formed in the axils of the leaves. The former are frequently allowed to remain until they have emitted roots of their own, and some cultivators find it impossible to induce them to send out roots after removal from the parent plant. This is difficult to understand, as they are generally easily induced to emit roots if taken off with a heel. Many cultivators put the offsets round the side of the pots occupied by the parent plants, and this was a regular practice with the late Rev. F. D. Horner, one of

the ablest and most successful cultivators of the Auricula in his day.

The offsets will root readily in most cases if they are removed and put in pots of sandy soil and covered with a bell-glass. It is often possible to obtain young plants by slicing up the root-stock and inserting the pieces in autumn in sandy soil and covering with a glass. The offsets may be taken off when large enough, but not just before flowering, as this would weaken the parent plants and injure their flowers at the blooming time.

Propagation by seeds is only practised by a few growers who are more than usually enthusiastic, but the pleasure of raising a new Auricula worthy of naming is so great that all who have the necessary time and patience should attempt it.

In the chapter on the "Improvement of the Auricula," a considerable amount of useful information for intending seedling raisers will be found, but the ambitious raiser will be wise not to expect too great results. As the late Mr. James Douglas, a highly successful raiser, said: "No better opportunity could be afforded to anyone who keenly desires to exercise patience than by attempting to raise show Auriculas." Mr. Douglas states that from the seedlings not one in ten will have a pure green edge, and that if the raiser "gets a really good one out of 500 seedlings he may rest and be thankful." He adds that even then he need not be too self-satisfied, as this Auricula may not retain its high promise. In support of his statement Mr. Douglas cites his experience in raising the fine grey-edge Auricula, "Silvia," which was procured by fertilising George Lightbody with pollen from Smiling Beauty. About 1,000 seedlings were raised from this

cross, and about half a dozen of promise were retained. One after another these fell away from their early good qualities until the only one left which was worthy of retention was Silvia. A somewhat similar experience with green-edge Auriculas secured Abbé Liszt. The process of cross-fertilisation is performed by means of a small camel-hair brush by which the pollen is collected from the anthers of one Auricula and conveyed to the pistil of the seed bearer. This should be done three times in succession. It is necessary to protect the seed bearer from bees and other insects, and this may be done by means of a small muslin bag.

It is desirable that each class of Auriculas should be kept separate in crossing—*i.e.*, green-edge Auriculas should be crossed with pollen from plants of the same class, and so on.

Seed should be ripe in the end of July or the beginning of August, and it ought to be sown at once, although some raisers keep it for a week or so before sowing. The operation may be deferred until spring, but in that case the proportion of seedlings will be smaller and a season will be lost, as a rule.

A good compost for the seeds is one composed of equal parts of good, turfy loam from an old pasture, old cow manure, two or three years old if possible, or from old hot-beds, and well-rotted leaf mould, rubbed down very small, and a little sand added. Some do not use the sand, but much depends on the nature of the loam. The soil should be well pressed down, and ought to be put in the pots to about an inch below the rim. The pots ought to be very well drained, and must be quite clean. The seeds should be scattered very thinly on the surface of the soil.

Some raisers merely cover the seeds with very fine soil,

but it is safer practice to leave them uncovered, simply pressing them very gently down. Place a piece of glass over the top of the pot to prevent the soil from drying too rapidly, and stand the pot in a saucer of water, which must be refilled when the water is soaked up by the soil. Some successful raisers do not put the pot in a saucer of water, but dip it in a pail until the water rises to the surface. Great care is necessary to see that the soil does not become dry, and many seeds are lost through neglect of this precaution. Watering overhead has the danger of washing down the seeds to a depth at which they cannot germinate.

As soon as the seedlings appear, which some of them will begin to do in about three weeks or a month, air should be given to prevent the plantlets from being drawn or damping off. A proportion of the seeds sown in August may not appear that year, but may delay until spring. With spring-sown seeds a number will remain dormant until the following season.

The young seedlings require close attention, as they must be kept moist, yet not wet. When they have made two or three pairs of leaves, they should be pricked out into other pots filled with similar compost. They ought to be kept rather close for a few days afterwards, and must have attention in the way of very careful watering. If they cannot be looked over daily they had better have a sheet of glass placed over the pot, tilting this up to admit air. If in a sunny frame or greenhouse, they must be shaded from the sun. Pricked-out seedlings are too often neglected, but they ought to be top-dressed when they require it, and as carefully tended as the old plants if they are to have any chance of giving satisfaction. When of sufficient size, they are put into single pots and treated in the same way as old plants.

Potting.—There are two schools of teaching with regard to the time of potting. According to one of these August is the best time, but the other is in favour of potting in the first or second week in May. Maddock and other old florists advocated potting immediately after the flower had ceased blooming, but many of our modern cultivators hold strongly to the belief that they secure better plants by potting in August than at any other time.

Potting is such an important operation that it is desirable to discuss it in detail. If badly done, or if the compost is not good, the plant suffers greatly, and no really first-class results can be expected.

The pots should be thoroughly washed and dried, and should be of a size suitable to that of the plant. Too large a pot is injurious, as the soil becomes soured and unwholesome. An average-sized Auricula requires a pot 5 or 6 inches in size, although some cultivators advocate a smaller one. A good layer of broken crocks is put in the bottom, and then a little of the rougher part of the compost, or some cocoa-fibre or a little moss laid on the top of this to prevent the finer soil from washing into the drainage. The pot should then be filled with the soil, which must neither be so dry as to refuse to absorb water, nor so wet as to stick together when pressed in the hand.

The compost ought to have been prepared beforehand and put in a heap protected from the weather. Its basis should be composed of one part of good turfy loam from an old pasture; one of good, sound, clean leaf soil; and one part of good, old cow manure, two or three years old, with some small pieces of charcoal and a little sand added. Another excellent recipe for the compost is four parts good fibrous loam, kept twelve months after being cut, and about 3 inches thick; one part thoroughly decayed cow

manure, one of good leaf soil, and one of coarse silver or river sand, adding to the whole some charcoal. These materials must be thoroughly well mixed. The old ideas of using carrion, blood, pieces of meat, and such unnatural diet for the compost are long exploded, and are only of interest from an historical point of view.

In potting great care is necessary. The plant must be turned out of the pot, and as much of the old soil taken off as possible by means of shaking the plant gently. Take the plant in the left hand as closely as possible to the foliage, or there will be a danger of its breaking through. With a sharp knife clear away all the old roots and cut out and off all unsound or decayed portions from the old stem. This should be carefully and thoroughly done, cutting back the old stock to healthy "wood." Rub some charcoal dust into the wounds caused by the cutting. The plant may then be placed in the pot, spreading the roots which remain carefully out, and filling the soil up to the collar of the plant, although not too far up, pressing the earth firmly, but not too stiffly down. If the potting is performed in May, the practice which is generally followed now, the plants may be removed to their summer quarters and kept close for a few days, withholding water for three or four days, after which it may be given sparingly.

Watering.—At all times this must be carefully attended to, or evil will undoubtedly follow. Auriculas must never suffer from want of water; on the other hand, they must never be too wet. It is therefore advisable to water the plants frequently and moderately, so that the soil does not become either too dry or excessively wet. In watering, the leaves must not be wet, and in spring this is all the more necessary to observe, as the beauty of

the plant will be greatly disfigured if water touches the foliage. Still more injurious is water in the heart of the Auricula, and it is therefore essential that all frames or houses in which they are cultivated should be water-tight above to prevent drip from lodging in the plants.

Frames or Houses.—While small lean-to or span-roof glasshouses are much more convenient for the cultivator of the Auricula than frames, they are more expensive, and it is not everyone who can indulge in the luxury of such. An Auricula house is a great source of pleasure indeed, and those who can afford one should certainly indulge themselves with it, so that they may enjoy tending their plants, and may be able to admire the beauty of their flowers with much greater comfort than when they are placed in frames.

It is unnecessary to give details of the construction of an Auricula house. It should, however, be low in the roof, yet just sufficiently high for the comfort of the cultivator and for ventilation, which should be provided at the top and sides. A simple structure which can be shaded during summer is all that is needed.

Although some can grow their Auriculas in ordinary frames, it is well to have them specially prepared for the accommodation of the flowers and fitted with stages for setting the pots on. The staging should be arranged in tiers like that of a lean-to greenhouse, and the frame may be about 4 feet wide, with the front about 1 foot high and the back 3 feet in height.

In winter the frames ought to face south, and should be protected at the sides, back, and front with straw or matting. In frost the top should be covered with mats also, these being removed when there is no frost. In summer and autumn—say May to October—the frames ought to face the north.

Cultivation.—After the plants have been potted and have become established, they will call for a certain amount of attention at all times. If the operation has been performed in May the plants will afterwards be in their summer quarters, and nothing can be better for these than a clean and fully ventilated frame at the base of a north wall. They enjoy the coolness of such a position at that season, while they require less frequent waterings. Give them plenty of air, but shelter them from strong gales to preserve the foliage.

In winter, as already mentioned, great care in watering and in covering the plants is essential, and in February, March, and April, if well cared for, the plants will be making rapid progress. In March and April we expect them to flower, although sometimes some of them are later. About the flowering time they must have great attention. Watering must be judiciously given—just enough to keep the soil moist, but not wet. Air should also be given freely, yet there ought to be no exposure to severe winds. Shading will sometimes be necessary, but it should only be applied in excessive sunshine, as with plenty of air the Auricula can stand a good deal of sun. Sometimes a plant will flag as if wanting water, but if the soil is moist it is a mistake to give any more. Turn the plant out, and it will be found that it is decayed at the neck; it should therefore be cut back to sound "wood" and repotted in new compost.

As the plants are coming into bloom, thinning the pips must be practised if the Auriculas are for show, or even for the production of first-class trusses and pips. From five to ten good flat pips are more pleasing than a larger number of poor ones. Thinning requires some practice in order for it to be done satisfactorily, and a pair of

sharp-pointed scissors should be employed for the operation. One truss is quite enough for a plant of the show Auricula. Many other points will call for attention, such as earthing up, removing a deformed pip, or freeing the truss from its guard leaf.

After flowering, equal attention should be given, and any flowers which have been cross-fertilised should be watched for the ripening of the seeds.

Top-dressing should be attended to about the end of February or a little earlier. Remove about an inch of the upper soil, and replace it with compost composed of about two parts of turfy loam, one of old cow manure, and one of old leaf soil. Certain cultivators deprecate this top-dressing, and assert that they obtain as good plants and blooms without it.

CHAPTER IX

EUROPEAN PRIMULAS

European Primulas in the Rock Garden—European Primulas in the Garden—European Primulas in Pots.

European Primulas in the Rock Garden.

It is particularly pleasant to write of Primulas for the rock garden, because in the first place the rockery, properly constructed and well situated, provides the most appropriate home for a genus of essentially Alpine plants; and in the second place the Primulas are capable of adding so much to the beauty of the rock garden that it is almost unthinkable that we should deprive the rockery of what may perhaps be fittingly termed its crowning charm. One hastens to remark that the "proper construction" proviso is of paramount importance, for despite the present-day popularity of rock gardening (almost amounting to a craze), we still too often meet with so-called rockeries which are graves rather than homes for Alpines.

I would emphatically point out that the fact that a plant grows naturally in high mountain slopes is no justification for allocating it to a heap of stones and rubble. Nor does it follow that a plant hardy enough to stand the winter severity of the Alps is therefore necessarily able to endure any sort of treatment (or ill-treatment) in our gardens. One must remember that

the climatic conditions prevailing at the high altitudes whence come most of our Primulas are vastly different from those under which one can grow them; the climate is strictly seasonal, with no spasmodic alterations of cold and mild temperatures, driving wind and soaking rain, and during the severity of winter, when frosts prevail, the plants are securely shrouded by a thick blanket of snow, under which they are kept comparatively in a dry state. Then, when spring comes and brilliant sunshine melts the snow, the root run is saturated with the snow water, thus affording the plants the cool moisture around their roots which is necessary to their vigorous growth in spring, although it would be fatal to them in the middle of winter, while in their quiescent stage. The exercise of a little thought and ingenuity will enable one to select and prepare crannies, recesses, or pockets where the roots of the Primulas can strike deep down and bury themselves under sheltering stones, whilst at the same time protecting boulders can be so placed as to ward off much of our winter's rain and afford some shelter from scorching sun.

In regard to soil, Primulas with few exceptions enjoy a mixture of fibrous loam and peat with something in the way of opening material, such as limestone chippings, brick dust, or rough sand. Peat, I am convinced, is of the utmost value, and I would be sorry to try to grow some of the choicer varieties without its aid, whilst none, so far as my experience goes, fail to do better with than without it.

Of even greater importance than compost, however, is drainage, and this must be as perfect as it can possibly be made. It is sheer folly to plant good Primulas over a bad subsoil where the roots will be nauseated in a mass of sour, water-logged earth. This should be patent to

all from the facts already stated—that an abundance of moisture is essential during the growing period, but fatal in the winter while the plants are at rest.

The sorts that come under Section Vernales, and which receive mention in the chapter on Primulas in the Open Ground, may be given positions in the lower, flatter parts of the rockery.

P. farinosa and P. frondosa make delightful features in hollows filled with limestone soil where they obtain plenty of moisture.

P. Auricula is best planted in a perpendicular position in a crevice between stones, and if the root run behind the stones is deep and the roots have direct access to a good body of soil the plants will flourish pleasingly. The variety albocincta is most beautiful and worth some pains to establish.

The advantage of perpendicular positions is that moisture cannot lodge in the crowns or hearts of the plants, a most fruitful cause of disease among Primulas when they are grown on the flat.

P. Palinuri is not one of the most accommodating, but if grown on an elevated and sheltered spot in peaty soil with a good deal of sand it will make vigorous growth and do well.

P. marginata and the variety Linda Pope are not fastidious either as to soil or aspect.

P. carniolica does best in half shade in a damp situation, but it also grows and flowers freely when planted in peat in a position facing south.

P. viscosa in its various forms is not difficult to grow either planted in a wall or on the level in good loamy soil.

The four species coming under Subsection Arthritica

have all smooth leaves with gristly margins. They are thus well adapted for exposed positions, and court the full rays of the sun; and do well if planted in pulverised turf with the addition of some peat and rough sand.

Those grouped under Subsection Erythrodrosum do best in half shaded positions, and require a fairly substantial soil with a proportion of good loam. The garden varieties of P. hirsuta are specially fine, and should not be omitted when forming a collection. I refer to "The General," "coccinea," "Balfouri," Mrs. J. H. Wilson, and nivea (nivales of gardens). Then there is P. decora of gardens and the white sport P. decora alba, a plant much easier to grow than P. nivea, but not so compact in growth, and with smaller and more serrated leaves. All the varieties of P. hirsuta are very modest in their requirements, presenting no serious cultural difficulties.

P. Kitaibeliana, which belongs to Subsection Rhopsidium, requires a soil made up of pulverised turf with about a fourth part peat and sand. It has only one or at the most two flowers borne on a very short scape, and is not so attractive as the others in the same subsection.

P. Allionii is worth any amount of attention. It flowers very freely with me in a sunless cave planted in calcareous loam, where it has unlimited root run.

P. tyrolensis does well in half shade planted in well-drained, peaty soil. Being a saxatile plant like P. Allionii, it should have ample root run, so that it can send its roots deep down.

P. integrifolia is quite a nice plant when it flowers, but with me, although it grows well, it does not always flower satisfactorily.

P. glutinosa and P. deorum, both belonging to Sub-

section Cyanopsis, are most unsatisfactory when grown on the rockery. They flower with me when grown in pots, but in the open ground I have failed to coax them into flower. Probably both would do better planted by the margin of a stream, where they could get their feet into running water.

P. minima, the only member of Subsection Chamæcallis, is well worthy of this distinction, for it is one of the most delightful little plants in Flora's kingdom. Small though it is, it is by no means miffy, and with reasonable care will behave well in a pocket where it is spared undue scorching. My recommendation is that it should be tried in the moraine, with its ample supply of moisture but sieve-like drainage, an excellent place for many of the smaller Primulas. P. scotica, for instance, does well in the moraine, and so will its allies P. farinosa and P. frondosa.

Many of the hybrids render a good account of themselves in the rock garden and flower well. P. × Murctiana, P. × Juribella, P. × intermedia, P. × Facchini, P. × Forsteri, P. × salisburgensis, P. × Marven, P. × venusta, and the strong-growing P. × Lindsayi, are all moderately easy to grow if given proper attention. By starting with any of the species and varieties I have recommended one may form the nucleus of a capital collection on a rockery of moderate dimensions, and as knowledge and experience is gained additions can be made, and so interest will be sustained in a hobby that cannot fail to bring an immense amount of enjoyment to a real lover of flowers.

In the warmer and more southern parts of these islands it is necessary to plant most Primulas in shady positions. A few exceptions which may be mentioned are P. marginata and P. farinosa, but it is a point in favour of the

majority of Primulas as town garden plants that they will be happy in places where there is insufficient direct sunlight for many other subjects; but in smoky towns it is necessary to exercise some care to prevent the foliage and flowers becoming coated with sooty deposits, whilst in the early spring the depredations of sparrows must be guarded against. Slugs are very partial to Primulas, especially those with flaccid leaves like P. viscosa, and require careful watching, as many of the Alpines, such as Aubretias, Arabises, and others of prostrate habit, afford harbours of safety for the slug, whilst they often lie hidden in some crevice of the rockwork until nightfall, when they sally out and do incalculable mischief. Any plants of prostrate or tufted habit which are likely places of refuge for the slug, during the day should be examined in the mornings and the enemies destroyed. It is also wise to search at night with a lantern and a piece of stick and a dish filled with salt into which to drop the culprit when caught. It is amazing how much damage a slug can commit in the course of a single night.

European Primulas in the Garden.

In the open air a number of the European Primulas will do well under simple conditions, such as may be afforded in almost any garden situated in an open position. Most of the species require to be cultivated on rockwork, but a fair proportion of them will grow well in a border provided they receive proper attention in the way of division and replanting as may be required. Many of these plants are lost in the open ground through being neglected, and the little attention often given to common border flowers would in many cases enable the Primulas to thrive and to give every satisfaction.

It is well known to many that the charming Primula hirsuta nivea (P. nivalis of gardens) will live for years in a border, and if grown in good stiff clayey soil growth will be rampant.

P. marginata, although naturally a saxatile plant, does splendidly in a border. It is almost unnecessary to say that P. Auricula and its various forms can be grown admirably in borders or beds. So can the forms of pubescens, which are many, and now almost numerous enough to supply the wants of small gardens in themselves.

The above remarks apply mainly to the northern parts of this country, but in the south the warm sun with drier conditions is fatal to the well-being of many Primulas. To grow them at all well it is necessary to plant Primulas in a shady border with cool moist soil. Under such conditions one may grow the many kinds of Polyanthus Auriculas, forms of pubescens, and those mentioned above, not to forget the Primrose and Cowslip. Among European Primulas few are really suitable for border cultivation, and it is only those strong-growing kinds like the Japanese P. japonica and some of the newer sorts from China which prove more adapted for this purpose. When it happens that a lover of Primulas is possessed of a garden which is prone to suffer from too scorching sunshine or when the soil becomes excessively dry, a good deal can be done to ameliorate the unfavourable conditions by mulching the beds in summer with either half-rotted leaf mould or cocoanut fibre, and oft-times it is possible to surround the Primula quarters with some shade-giving shrubs or tall perennials. No one who really appreciates the chaste beauty of Primulas will begrudge attentions of this kind in the effort to make them feel at home, and when it is borne in mind that

many members of this family produce a display of truly lovely flowers at a time of year when flowers are none too plentiful in the garden it will be agreed that they are worthy of any special care or attention they may exact.

European Primulas in Pots.

The gathering together of a collection of choice hardy Primulas and their cultivation in pots becomes to an enthusiast a most fascinating pursuit. No one fully realises, except from personal experience, the vast amount of pleasure the Auricula fancier derives from his plants, and the possession of an assortment of the gems among hardy Primulas affords parallel enjoyment. Auriculas are fully dealt with in other chapters of this work, and my present purpose is to impart some information on the requirements and cultivation of other Primulas. The main principles to be borne in mind are that we are handling hardy plants, which neither require nor enjoy anything in the nature of "coddling" treatment. The idea of cultivating under glass is not for the purpose of forcing with artificial heat, but rather to guard against the vagaries of a fickle climate, so that the plants may not be unduly sodden with heavy rains during their dormant period nor subjected to cutting and parching winds when new growth or flowers are being produced.

A further advantage is that a small plant in a pot can be handled, examined, and guarded from harm so much better than when growing in the open, where it is prone to attacks of marauding insects, and maybe to suffocation from some too rampant neighbour. Suitable accommodation may be provided by a frame, such as is suggested for the Auricula. When possible, however,

a small house will be found a great advantage, since the attention required by the plants can be given with greater comfort, and inspection is much more enjoyable, especially in bad weather. The house may be of the simplest description. A span-roof one is better than a lean-to, but this is largely a question of convenience. It must, however, have plenty of side and top ventilation. The houses for growing and flowering Alpines, which are now becoming more common, may be utilised, and nothing can be more pleasing in spring than a house filled with Primulas and other gems of the Alpine flora. The roof should not be high, and the plants ought to be kept well up to the light.

A good compost for the majority of Primulas is one consisting of two parts loam, two parts peat, one part leaf mould, and one part sand. The compost should be sterilised and allowed to lie for some considerable time before potting. Firm potting is imperative. With the compost for the lime-lovers some calcareous matter in the shape of old mortar, limestone chips, or stones may be added. Primulas which are found difficult to grow will do well in a compost of peaty leaf mould and sand. The rock-lovers can easily be accommodated by having the roots well jammed between two stones sunk in the pot, but they do not require so much of this attention as might be thought when they are in pots, as the confined quarters enable them to reach the sides of the pots with their roots. The size of the pots should be such as to comfortably accommodate the plants. Under rather than over potting should be practised, it being much better to have the Primulas in small pots than the reverse, because too great a body of soil is liable to become sour. For several plants a pan may be used instead of a pot,

and good pans of some of the freest-growing species are very beautiful under glass. The pots or pans must be well drained, and when repotting all decayed leaves should be removed and the plants divided for increase and properly placed in the centre of the pots. Decayed portions of the roots or root-stock should be cut out carefully with a sharp knife, and the wounds dressed with powdered charcoal.

Top-dressing may be performed at intervals, and if the pots are kept under glass in summer, shading should be given in the brightest weather. Some cultivators have the houses built so that the top lights may be removed altogether during summer. The plants are plunged in ashes or gravel on the stages, and they do not suffer so much from drought. Where this cannot be done many growers plunge the pots in ashes under a north wall, where they remain until September, when they are returned to their winter quarters.

Some cultivators of hardy Primulas discard the pots altogether, and grow them in beds in the open air, covering these with handlights or frames during the winter and spring months. This serves the purpose of throwing off excessive rains in winter and of prolonging the beauty of the flowers in rough weather. If handlights only are employed, they must be raised on posts 18 inches or 2 feet above the ground, and firmly fixed in order to prevent them from being blown off during high winds. Primulas in pots are very subject to attacks of thrip, green-fly, and red spider.

The treatment is referred to under the chapter on Diseases and Pests.

The utmost cleanliness should be exercised, and the houses kept moderately moist and cool.

It may be taken as a safe policy to allow Primulas an abundance of water as long as they are in active growth, and to keep them fairly dry during the resting period, too much wet then being far more dangerous than frost, although, of course, it is unwise to permit plants in small pots to be frozen solid.

CHAPTER X

PROPAGATION

Raising from Seeds—Division of Rhizomes—Cuttings—Offsets.

Raising Primulas from Seeds.

Although propagation by division is the more common method of increasing the greater number of the European Primulas, a considerable proportion can be readily raised from seeds, and with reasonable care there are few which will not recompense the cultivator who attempts to raise his Primulas in this way. There are, doubtless, several points which require some attention, and raising these plants from seeds entails a considerable sacrifice of time; but, on the other hand, the young plants are generally more vigorous, and a considerable number can be secured at slight cost if the seeds require to be purchased, and at practically no expense if they are saved at home. Then, of course, in a mixed collection, either with or without hybridising and cross-fertilisation, there is always a chance of obtaining new hybrids or varieties. Systematic hybridising and cross-fertilising constitutes one of the most absorbing and interesting features of our hobby. The actual operation is simplicity itself, and may be mastered with ease; but the study of desirable crosses, the experiments that one is constrained to make, the keeping of records, the exercise of patience involved, and the ultimate watching of pan after pan of germinating seeds,

and the care of the plants until they develop their fresh blossoms, either to fill us with delight or temporarily to disappoint us, but nevertheless spur us on to renewed effort, all contribute toward a measure of pure enjoyment that cannot well be gauged, and would baffle the most eloquent to describe.

In the first place, it is necessary to prepare a supply of good porous flower-pots or pans. These must be perfectly clean. The round pans are less liable to breakage than the square ones, besides being cheaper, but the latter occupy much less space.

A supply of soil should also be prepared. Its precise composition may vary a little, but one part of fibrous loam, one of leaf soil or peat, and about a half of silver sand will be generally suitable. It should be mixed together and passed through a $\frac{1}{4}$-inch sieve. When used, it should not be wet enough to cling together if pressed in the hand, nor should it be dust dry or nearly so. The proportion which does not pass through the sieve can be laid to the side for covering the drainage of the pots or pans. This drainage should nearly half fill the pans or pots, and should be composed of broken crocks, being careful to put one good-sized piece over the hole in the bottom, and placing the smallest pieces on the top. Lay over this some of the rougher compost, as already mentioned, and fill up the pan to within an inch of the rim. Press the soil gently but firmly down with a flat piece of wood, and then sow the seeds very thinly on the surface. Previous to sowing the seeds some water the earth in the pots, and allow the water to run away before sowing. If this is done the seeds may be lightly covered with fine soil, and gently pressed down. Other raisers prefer to sow the seeds and to cover them before

watering, which is done gently through a fine rose. The former method is less liable to dislodge the seeds after they are sown. It is essential that they should be just covered, and no more. Some do not advocate covering them, but the experience of the writer is that a greater proportion germinate when covered. On the top of the pan lay a piece of glass, and cover up with brown paper. The pans may then be put in a cold frame or a cold or slightly heated greenhouse. It is generally easier to attend to pots when in a house than in a frame.

The best time to sow Primula seeds is generally as soon as they are ripe or a few days after. They should be gathered whenever the capsules begin to open, as, if left longer, a number of the seeds will be lost. They can be laid on a sheet of paper in a sunny house or room until all are ready. They can also be sown in spring, in which case the proportion which will germinate the first season will not be so large.

It has been found that autumn-sown Primula seeds germinate more rapidly and freely if the pans are subjected to a fall of snow, and then taken under glass again. This refers to Auriculas, but will probably be found the same with all the European Primulas.

It is necessary to see that the seed pans never become too dry, and the glass covering avoids the necessity for frequent waterings. If the soil begins to become dry the pans may be placed in a can of water, and held there until the water begins to rise through the soil.

As soon as the seedlings begin to appear, the glass and paper must be at once removed and air and light given to the seedlings, but they must on no account be exposed to the direct rays of the sun. They ought to be kept near the light, and a shelf near the ridge of the house will

be found useful for them. The pans should be watered as needed in the same manner as before the seedlings have appeared. As soon as the young plants have made a pair of their second or true leaves, they ought to be carefully pricked out into similar soil to that used for the seeds. About an inch apart will be enough. The soil in the pots should be as little disturbed as possible, as many seedlings of most Primulas will not appear until the following year.

For example, seeds sown in autumn of any one year will produce a proportion of seedlings the first spring, but many seeds will lie dormant until the second spring, and the later arrivals frequently prove to be the finest.

When the young plants are in their early stages of growth they must be watched carefully for damping-off, which is generally caused by the surface of the soil being damper than below, but it is frequently produced by overcrowding. After being in the pricked-out stage for a month or two they can be planted out in the reserve pots in partially shaded positions or put into other pans or boxes. They should not be planted out in the open after the end of September.

Propagation by Division.

Apart from seed raising, the most generally adopted method of increasing European Primulas is by division. In a few instances propagation by root cuttings is possible, and may be deemed advisable when a large increase of stock of a particular variety is desired. The first consideration will be the selection of a suitable spot and preparation of the bed. Neither full sun nor boisterous winds will facilitate success in the task under consideration, so that care should be exercised to choose a shaded

and sheltered part of the garden for the propagating beds. If the soil is very heavy it is desirable to work in some burnt earth, wood ashes, or leaf mould, but otherwise careful digging, evenly breaking down the soil, will be all the preparation that is needed, unless the bed happens to be in an excessively wet place, where stagnant water is likely to be troublesome in winter. Such a bed would require raising or ridging to a considerable height, so that the young plants may be planted on the crown of the bed, and the surplus moisture would drain away to the sides. Of course, a bed in such a position is far from ideal, but there are occasions when one has perforce to make the best of imperfect conditions. The time for division of Primulas is as soon as possible after flowering, showery weather being most suitable for both the lifting and replanting; but rather than delay too long, resort must be had to artificial watering, because it is of paramount importance that the young shootlets shall have time to make fresh roots and obtain a firm hold of the soil before the arrival of frosts, otherwise there will be no end of trouble through the alternate expansion and contraction caused by the frosts leaving the plants right on the surface with their roots exposed to winds and frosts.

We shall first deal with the division of the Primrose, Cowslip, Oxlip, and Polyanthus. The plants ought to be carefully lifted with a fork, keeping the roots as whole as possible, and without injuring the foliage. After lifting the plants the rhizomes, or root-stocks, should be cut through with a sharp knife, keeping always a crown to each portion, which should also have a few roots attached. The pieces should then be replanted, pressing them well down so as to make the soil firm about them,

and giving a good watering if there is no sign of rain. They will flag for a little, and if the place where the beds are situated is a sunny one, the plants may be shaded by means of tiffany, mats, cheese-cloth, or similar material, allowing the air, however, to enter. They may require subsequent waterings, but if these are necessary they ought to be thorough, and not mere sprinklings. This operation of division should be performed every two years or so if the best results are desired from the plants, and if specially rapid increase is desired the process may be repeated annually. In addition to Primroses, Polyanthuses, Cowslips, and Oxlips, some of the more free-growing Primulas, such as P. marginata, may be treated in a similar manner, but it is not everyone who cultivates these in the same numbers as the common Primrose and its closest allies, and they generally receive a little more care. When replanting the divisions they should be put in deep enough for the base of the lowest leaves to touch the soil. Those kinds of Primulas which have a branching habit, making offsets from a central collar or trunk above the ground-line, are rather more difficult to propagate than those aforementioned.

Propagation of these types must depend practically upon striking cuttings, and although the reader may be inclined to think that this is so simple an operation that no particular instructions are necessary, it is well to remember there is a vast difference between a Geranium or Fuchsia and a choice, slow-growing Primula, and as some of these make but two or three offsets in as many years it is prudent to be careful in details of their treatment. Where a number of offsets emanate from one root-stock they may be gently pulled away with a " heel," such cuttings being fairly easily rooted, but this frequently

involves sacrifice of the old plant, and cannot be resorted to when only one or two offsets are available. These latter should be very carefully cut off with a narrow, keen-edged knife, making the cut squarely immediately below a firm joint. Only dead or decaying foliage should be removed from the cuttings, great care being taken in the case of thick, fleshy-leaved kinds not to crack or bruise a good leaf.

Immediately the offset is cut off the wound should be dipped in a saucer of powdered charcoal to check bleeding. The rooting material should very largely consist of very sharp, clean sand, with an admixture of either sifted peat, leaf mould, or cocoanut fibre. The cuttings should either be placed singly in the smallest pots procurable, or close round the edge of shallow, well-drained pans, fixing each firmly in position with the basal leaves close to the surface, but not partially buried. With one good watering at the time of potting they will go far towards rooting without further supplies, provided the pots or pans are plunged to the rims in either cocoanut fibre or sifted ashes, and the propagating frame is situated in a sheltered and shady corner. For the first couple of days the frame should remain closed, after which air must be admitted, but anything approaching a drying draught must be avoided by opening the frame on the opposite side to that from which the wind is blowing.

At the close of very hot days, if the foliage of the cuttings shows a tendency to limpness, they may be sparingly syringed with a very fine-nozzled spray syringe, but it must ever be borne in mind that anything like stagnant moisture in the propagating pot or frame is calculated to result in damping off the cuttings.

In certain types which have a habit of throwing up

offsets well above the ground-line, and from the central "trunk" or stem, a safe and successful method to adopt is to cut a notch with a small, sharp knife on the underside of each offset, and then mound the stems round with a mixture of sharp silver sand and cocoanut fibre. Roots are readily emitted into this compost, and then, if the whole mass is lifted carefully, the rooted offsets can be cut asunder without damage to the central crown. In this way practically every offset may be rooted, and the young plantlets will grow right away more vigorously than if struck as ordinary cuttings.

CHAPTER XI

PRIMULA DISEASES AND PESTS

Like all other plants, Primulas have their enemies in the shape of diseases and pests. In order to cope with these it is advisable to know something about them and their natures, so that we may be in a position to employ the necessary preventives or remedies.

Among the most troublesome are the diseases which are of a fungous character, and considerable attention has been devoted to their study by eminent scientific men. Among these are Dr. M. C. Cooke, whose invaluable contributions to the knowledge of these pests are mainly drawn upon in the part relating to their nature and treatment, supplemented by practical knowledge of some of the more plentiful.

The common Primrose and its near allies are peculiarly liable to suffer from some of these diseases, and cultivators of double Primroses and named Polyanthuses have had at times too much reason to dread their ravages among their favourite flowers.

Of these the most dangerous is the rot-mould, *Peronospora candida*, Fckl., but it is not so prevalent as to be generally troublesome. The leaf-moulds are by far the most plentiful. Rusts and smuts are also very common. It is unnecessary to remark that all are, at least, weaken-

ing to the plants they attack. The principal fungous diseases which attack the Primulas are the following:

Primrose Rot-Mould (*Peronospora candida*, Fckl.).

As has been indicated, this is the most dangerous of the diseases of the Primula family. Very fortunately it has seldom visited plants in gardens, although it has appeared on those growing wild. It is more common on the Continent than in the British Isles, and we have not as yet much reason to dread its appearance in our gardens. Affected plants should be burned at once, and, in addition, some of the soil immediately about them ought also to be sterilised by fire.

The presence of *Peronospora candida* may be detected by the white mouldy spots which appear on the under-surface of the leaves. They are snowy white, and are quite readily detected, though not close together.

Primrose Simple-Brand (*Uromyces primulæ*, DC.).

Uromyces primulæ is one of the most widely distributed of the diseases, and has been recorded over a wide area, including the United Kingdom, France, Germany, Austria, Italy, and Asiatic Siberia. It is found on the leaves of the Auricula, including both show and Alpine varieties, and also on the foliage of Primula integrifolia and allied species. In gardens it may probably extend to other Primulas, and all affected leaves should immediately be destroyed by burning. It has brown, warted, one-celled, ovoid, or elliptical teleutospores, with a hyaline papilla at the apex.

This and the following have been united, with *Æcidium primulæ* as the Æcidiospore form.

Primrose Rust (*Puccinia primulæ*, DC.).

This is not common in gardens, and I have never met with it in this country, though it is said to exist in Great Britain and Ireland and different parts of the Continent. This disease is marked by the presence of somewhat rounded spots on the lower surface of the leaves, and from these soon appear the powdery pale brown uredospores. The pustules of the teleutospores are darker in colour, and the latter are two-celled.

Primrose Cluster-Cup (*Æcidium primulæ*, DC.).

The casual observer will be disposed to question the opinion of authorities that this is only an early stage of the preceding disease, seeing that the cluster-cup may be present without the Primrose rust and vice versa. The white-edged, fringed, urn-shaped cups are crowded together in a discoloured spot or spots on the under-surface of the leaves. The æcidiospores are yellow, and are arranged in chains between the cups.

Primula Leaf-Spot (*Phyllosticta primulæcola*, Desm.).

This is not a prevalent disease, even where it originated in France and Belgium, and it is most frequent on *Primula acaulis* and *P. elatior*. It may be distinguished by the presence of large, brownish-margined, white spots on both sides of the leaves. These are occasionally dotted with small black receptacles. What is known as Scotch leaf-spot (*Ascochyta primulæ*, Trail) much resembles this, but has larger sporules divided into two cells.

Wild Primrose Leaf-Spot (*Septoria primulæ*, Buck.).

This rare leaf-spot, which is only recorded from the neighbourhood of Bristol on wild Primroses, is most

apparent on the upper side of the leaf. It is pale-coloured and rather rounded with a brown margin. The spots can hardly be distinguished from those of other forms, and the small perithecia are sparsely distributed over the spot. The long sporules are threadlike in form.

Primrose Smut (*Urocystis primulicola*, Magn.).

A most troublesome pest is that named above, which attacks the seeds or fruit of the Primulas, and fills the capsules with a smut resembling that of the violet smut, but attacking the Primula on the fruit instead of the leaf. It must not be neglected, as, when once it has taken possession of a Primula, it will reappear. All affected plants should therefore be burned as soon as the disease is observed. The rounded or irregular groups of spores are formed of several—generally seven to ten—teleutospores, dark brown and rather globe-shaped, but becoming angular. It is recorded from Italy, Silesia, and Saxony.

Primrose White-Mould (*Ramularia primulæ*, Thum.).

This is the more common of the two Primrose white-moulds, and is found in Great Britain, Austria, Siberia, and Italy.

Its presence may be detected by the rather circular, pale, ochre-like, coloured spots with tufts of the mould produced on the surface. It is doubtful if the long threads ever branch. The conidia are occasionally divided transversely into two divisions, are uncoloured, and are rather cylindrical in form, tapering to the end. Weak Bordeaux mixture has been tried with success.

Ovularia interstitialis, Cooke.

This is the other recorded white-mould, and is supposed to be the same as *Ovularia primulana*, Karst. Both have been found on the leaves of the common Primrose. It forms yellow patches on the underside of the leaves, these being entirely between the veins. It produces short, apparently unbranched threads, whence the conidia are supported by spicules. The conidia are elliptical, probably easily dealt with by means of Bordeaux mixture or other fungicide.

Primrose Black-Mould (*Cercospora primulæ*).

This disease, although not yet recorded in this country, may appear at any time, as it has been found in France on plants of *P. elatior*. It forms whitish-grey spots on the leaves. On these are produced olive-coloured, short threads. The long conidia are narrowed to almost a point at the apex. They are separated into several cells by eight or nine septa. No treatment has been suggested for this except that of destroying affected leaves.

Auricula Brown-Mould (*Heterosporium auriculæ*, Cooke).

This is a most troublesome disease when it does appear, though, happily, it is only rarely that our gardens are visited by it. It has been found on the leaves of Primula auricula, and might easily spread to species with similar foliage. It is readily distinguished by the appearance on the surface of the leaves of velvety-looking, smoke-coloured patches, whence rise rather flexuous, thin, unbranched, erect, olive-coloured threads. The conidia are rather elliptical in form, terminal, and eventually divided by one or two septa, and with small, rough, wart-like points.

The destruction of affected leaves or spraying with a copper carbonate ammoniacal solution has been suggested as a remedy. Burning the affected plants or leaves and spraying with Bordeaux mixture are the best remedies for most of the above diseases.

Botrytis Cinerea, Pers.

This disease occurs in some species.

Aphis.

A frequent source of trouble to cultivators of Auriculas and other members of the Primula family is the attack of green-fly or aphis. In the open air this pest gives but little annoyance, but occasionally it appears even there. In any case, this enemy should not be allowed to gain possession, or serious injury to the plants will be occasioned. Some growers recommend fumigation with any of the recognised insecticides, but others object to this process and advise other methods. If fumigation is attempted the plants should be quite dry on the leaves, and several mild applications in succession will be found safer and more permanently effectual than one stronger one. Small brushes are used by many practical cultivators of the Auricula and other members of the Primula family under glass, and with care this is quite satisfactory. Dipping or spraying with insecticides in weak solution is also frequently practised. It is safe to keep well within the strength stated by the makers on the packages.

Mealy Louse.

One of the most frequent and disastrous enemies of the Auricula and allied Primulas cultivated under glass is the

Auricula mealy louse, called *Trama auriculæ,* which attacks the collar and roots of the plants, and extracts from them the sap required for their nutriment. The attacks on the collar are more dangerous than on the roots, but in either case the mealy louse is a dangerous enemy, and should be coped with at once. It is advisable to perform the operation of destroying the louse at repotting time, and this may be done by the application of a solution of soft soap, some adding a little fir-tree oil or Gishurst compound. It is sometimes necessary to adopt this treatment at other times than that of repotting, but this must only be done as a last resort.

Red Spider (*Tetranychus telarius*).

Red spider is a great source of trouble to those who are cultivating named Polyanthuses and Primroses in frames, and in order to prevent its appearance the structures should not be too dry, since a dry atmosphere with a comparatively high temperature is congenial to the red spider. It should be looked for in early summer, and whenever leaves show signs of becoming yellow and spotted this pest should be suspected and dealt with. An old remedy was to remove the plants from the soil, and then to soak them from two to three hours in a strong infusion of tobacco water. Safer remedies are now at command, and insecticides of repute may be applied in the proportions recommended by the manufacturers. A favourite cure for red spider adopted by the florists in the palmy days of the cult of the Polyanthus was flowers of sulphur mixed with water. This was carefully applied to the under-surface of each leaf with a sponge dipped in the liquid. Sulphur is occasionally employed as a powder, dusted dry on the leaves. A more modern method of

preparing it is to boil in 2 gallons of water 1 pound of sulphur and 2 pounds of quicklime. Another recipe is 2 ounces of soft soap and 4 ounces sulphuret of lime, these being properly mixed and a gallon of boiling water poured over them, stirring well all the time. The plants can either be dipped in this mixture or the liquid applied with a brush. Plenty of air and a cool atmosphere will, however, prevent the appearance of this troublesome pest.

Slugs and Snails.

It is only necessary to remind the reader of the havoc wrought by slugs and snails in collections of Polyanthuses, Primroses, etc. They are most destructive, and it is essential to be on the watch for their appearance and to destroy them as soon as possible. The traces of their slime on or about the plants should be watched for, and, should such be seen, the culprits must be searched for. Night is the best time for slug-hunting, but a search under the pots often leads to the capture of these enemies of our flowers.

Worms.

Worms are also a source of considerable annoyance with Auriculas, Polyanthuses, and all other plants of the kind when cultivated in pots. Whenever worm casts are seen in the pots the worms should be destroyed. This is easily done by turning the ball out of the pot as carefully as possible, so as not to disturb the roots. The worm will generally appear, and can be taken out and destroyed. Should it not be found, a little lime water or other preparation for destroying worms should be poured on the soil.

Grubs.

Grubs of various species are injurious to some of the Polyanthuses and other Primroses of the same class. We have seen good collections of Polyanthuses in the open ground decimated by the attacks of a large grub which seems like that of the crane-fly, or daddy-long-legs, *Tipula oleracia*, or a species closely akin to it. Traps of carrot or turnip may be sunk in the ground near the plants, and examined now and again.

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